ARTICLE XXVI.—THE CRUSTACEA OF THE SUBANTARCTIC ISLANDS OF NEW ZEALAND.

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INTRODUCTION.

The collection of *Crustacea* actually made during the expedition was not very extensive, owing to the fact that very little dredging could be done, and that the Campbell Island station, where I spent most of my time, was not a favourable one for the littoral and marine forms. I have, however, been able to examine and incorporate in this report numerous species that were gathered at other times by Captain Bollons, Professor W. B. Benham, and Dr. L. Cockayne. To these gentlemen and to the various members of the expedition who so willingly collected *Crustacea* for me at places inaccessible to myself I wish to record here my best thanks.

No separate list of the *Crustacea* from these islands has, so far as I am aware, hitherto been published, though several species have been recorded from them at different times by the various scientific expeditions that have visited antarctic seas, by the late Captain Hutton,* and by the late Monsieur Henri Filhol.† In this report I record the occurrence at these islands of seventy-five species—viz., *Decapoda*, 12; *Stomatopoda*, 1; *Amphipoda*, 34; *Isopoda*, 20; *Tanaidacea*, 1; *Nebaliacea*, 1; *Entomostraca* (*Cirripedia*, *Copepoda*, and *Branchiopoda*), 6. It will be seen that the greater number belong to the *Amphipoda* and *Isopoda*. Doubtless many other *Decapoda* would be added as the result of systematic dredgings round the islands. No proper attempt has yet been made to collect the *Entomostraca*.

In the general classification I have followed that adopted by Dr. W. T. Calman in his recent work on the *Crustacea* for Ray Lankester's "Treatise on Zoology," while in the *Amphipoda* I have mainly followed the classification in Stebbing's "Das Tierreich Amphipoda," though with some slight modifications.

The forms not hitherto described are few in number. I describe only one new genus and nine new species; but, on the other hand, I have reduced a much greater number both of genera and of species to the rank of synonyms, for reasons that I hope will be considered satisfactory. This I have done chiefly in the *Amphipoda*, for which group I have fortunately been able to consult most of the reports on the

* Trans. N.Z. Inst., xi, pp. 340, 341.
† "Mission de l'Île Campbell."

recent expeditions to southern seas ; and, as many of the forms found at these islands are circumpolar in distribution, I have been in a position to correlate the various reports, and to decide in certain cases where the same form has been described under different names by different authors. In several groups of the *Amphipoda* the multiplication of genera has been carried to what appears to me an unnecessary degree, and characters have therefore been introduced into the generic diagnoses which, in some cases at any rate, are subject to individual variation. While the multiplication of species is bewildering enough, the unnecessary subdivision of genera creates still greater confusion.

As regards the geographical distribution of the species concerned, the results seem to be somewhat important. Naturally, the chief interest attaches to the terrestrial and fresh-water forms of the *Amphipoda* and *Isopoda*. Of these, there are in the islands three fresh-water and fourteen terrestrial species, including under the latter the sand-hoppers found on the shores. Of the fresh-water species,* two occur also in New Zealand; one of these (*Idotea lacustris*) is also found in Tierra del Fuego, the other (*Chiltonia mihiwaka*) is allied to species of the same genus found in Australia and Tasmania, and is represented in South America by the closely allied genus *Hyalella*. The third fresh-water species belongs to the genus *Atyloides*, of which two species have been described from the fresh waters of Victoria, but none as yet from the main islands of New Zealand. The genus as at present defined contains both marine and fresh-water species.

Of the fourteen terrestrial species, four belong to the genus *Parorchestia*, and three of these are peculiar to the islands, the fourth species being found on the Snares and in New Zealand (Stewart Island). Another closely allied species of this genus is very abundant in New Zealand, but has not yet been recorded with certainty from the subantarctic islands ; but, as I have explained below, the identification of species in this genus is particularly difficult, and, in any case, we have here one terrestrial genus common to New Zealand and the islands, and represented by slightly different forms in the different islands. Of the remaining terrestrial species, four are endemic, but are represented in the main islands of New Zealand by closely allied species, and five others are identical with New Zealand species; consequently the connection between New Zealand and the islands lying to the south of it is very close, and the existence of so many similar forms in the two localities points, I think, undoubtedly to previous land connection. The remaining terrestrial species occurs also in South America, but has not been recorded from New Zealand.

These terrestrial species, like the fresh-water ones, also show connection with those of South America, Falkland Islands, and other subantarctic localities. One species, *Trichoniscus magellanicus*, found in both Auckland and Campbell Islands, is, I think, identical with one found in Tierra del Fuego and the Falkland Islands, and is very closely related to *T. verrucosus*, which has recently been described by Budde-Lund from the Crozets. Both these species, together with *T. thomsoni* (found in the Auckland Islands and also in New Zealand) and with some other New Zealand species, belong to a separate section of the genus *Trichoniscus*, confined in its distribution to

* I have not included *Parorchestia tenuis* (Dana) among the fresh-water species, as it can also live in brackish or even in salt water.

subantarctic regions. Another species, *Deto aucklandiae*, belongs to a genus of similar distribution, for species are known from New Zealand and the neighbouring islands, South America, Cape Colony, St. Paul (in the Indian Ocean), and Australia, and the genus is not known from any other locality. The Auckland Island species is peculiar to those islands, but is represented in New Zealand by *D. novae-zealandiae* (Filhol), which is very close to, if not identical with, a species described many years ago from Chili under the names *Oniscus bucculentus* (♂) and *O. tuberculatus* (♀), Nicolet.

The conclusions drawn from the above facts would be strengthened by a consideration of the distribution of the species of *Hyale* found on the subantarctic islands of New Zealand, for though, of course, marine, they are found only in shallow waters near the coast. Of the three species, one, *H. campbellica* (Filhol), is known only from Campbell Islands, and is a doubtful species; of the other two, one certainly extends to South America, South Georgia, and Kerguelen, and the other probably to South America.

The marine *Crustacea* from these islands, omitting the *Entomostraca*, number fifty. Of these, only one genus and four species are endemic, and two of these species are doubtful; of the remainder, thirty are found in one or more of the other subantarctic or antarctic localities, and about eight of the others extend to Australia and other places beyond New Zealand, while only twelve are confined to the New Zealand region, and some of these are represented by closely allied species in other subantarctic islands. Some five antarctic or subantarctic species are found in the islands, which do not appear to extend to the main islands of New Zealand.

It will thus be seen that the marine forms very considerably strengthen the evidence as to the large antarctic element in the crustacean fauna of these islands and to the close similarity of their *Crustacea* to those of the other subantarctic regions.

In connection with the species of the terrestrial genus *Parorchestia* there is one point that seems worthy of note. It is a curious fact that although the male of *P. sylvicola* (Dana) on the main islands of New Zealand is very rare, nearly all the specimens captured being females, yet in the three species found on the Auckland and Campbell Islands the males appear to be almost as abundant as the females —at least, so far as the collections before me enable me to judge. I have noticed that with species of *Orchestia* and *Talorchestia* on the sea-shore of New Zealand the males are usually fairly abundant, and approximate in number to that of the females. Whatever may be the conditions producing this result in littoral situations, it is probable that the same conditions obtain to a considerable extent over the whole of these subantarctic islands, for, owing to the damp climate and the abundance of undergrowth, the soil is always more or less wet, and the strong westerly winds carry the sea-spray over the greater part of the islands. In islands like these it is easy to see that the transition from life on the sea-shore within reach of the sea-spray to terrestrial life at higher altitudes may be quite gradual, and be easily accomplished.

I have not repeated all the references given in well-known works, such as Stebbing's "Das Tierreich Amphipoda," but have given only those that appeared necessary in each case.

LIST OF SPECIES.

Subclass MALACOSTRACA.

Order DECAPODA.

Suborder REPTANTIA.

Section BRACHYURA.

1. *Leptomithrax australis* (Jacq. et Luc.). Auckland Islands and New Zealand.*
2. *Prionorhynchus edwardsii*, Jacq. et Luc. Auckland and Campbell Islands, and New Zealand.
3. *Cancer novae-zealandiae* (Jacq. et Luc.). Auckland Islands and New Zealand. (A closely allied species in Chili.)
4. *Nectocarcinus antarcticus*, Jacq. et Luc. Auckland and Campbell Islands, and New Zealand.
5. *Hemiplax hirtipes*, Heller. Campbell Island and New Zealand.
6. *Halicarcinus planatus* (Fabr.). All subantarctic seas.
7. *Hymenosoma depressum*, Jacq. et Luc. Auckland Islands and New Zealand.

Section ANOMURA.

8. *Porcellanopagurus edwardsi*, Filhol. Campbell Island and Snares. (Allied species in Australia and Juan Fernandez.)
9. *Eupagurus campbelli*, Filhol. Campbell Island.
10. *Munida subrugosa* (White). All subantarctic seas.

Suborder NATANTIA.

11. *Nauticaris marionis*, Spence Bate. Auckland and Campbell Islands; New Zealand; Marion, Prince Edward, and Falkland Islands.
12. *Palaemon affinis* (H. Milne-Edwards). All subantarctic seas.

Order STOMATOPODA.

13. *Lysiosquilla spinosa* (Wood-Mason). Auckland Islands, New Zealand, and Indian Ocean.

Order AMPHIPODA.

Suborder GAMMARIDEA.

14. *Nannonyx kidderi* (S. I. Smith). Auckland and Campbell Islands, New Zealand, Tasmania, and Kerguelen.
15. *Tryphosa kergueleni* (Miers). Snares, New Zealand, Victoria Land, and Kerguelen.
16. *Tmetonyx stebbingi* (Walker). Auckland Islands and Cape Adare.
17. *Phoxocephalus kergueleni*, Stebbing. Snares and Kerguelen.

* By " New Zealand " in this list of localities the main islands only are included.

18. *Harpinia obtusifrons*, Stebbing. Campbell Island, New Zealand, Victoria Land, Kerguelen.
19. *Liljeborgia dubia* (Haswell). Auckland Islands, New Zealand, Australia, &c.
20. *Carolobatea novae-zealandiae* (Dana). Auckland Islands, New Zealand, and Kerguelen.
21. *Leptamphopus novae-zealandiae* (G. M. Thomson). Auckland Islands, New Zealand, Victoria Land, and Graham Land.
22. *Bovallia monoculoides* (Haswell). Auckland Islands, South Georgia, Graham Land, South Atlantic and Indian Oceans.
23. *Pontogeneia antarctica*, Chevreux. Auckland Islands, Campbell Island, and Graham Land. (Closely allied species in New Zealand.)
24. *Paramoera austrina* (Spence Bate). All subantarctic seas.
25. *Atyloides serraticauda*, Stebbing. Auckland Islands, Australia, Victoria Land, and Graham Land (Flanders Bay).
26. *Atyloides magellanica* (Stebbing). Auckland Islands, Victoria Land, Tierra del Fuego, and Graham Land.
27. *Atyloides aucklandicus*, Walker. Auckland Islands. (Allied species in Victoria, Australia.)
28. *Parapherusa crassipes* (Haswell). Antipodes Island, New Zealand, and Australia.
29. *Melita inaequistylis* (Dana). Auckland Islands, New Zealand, and Indian Ocean.
30. *Paradexamine pacifica* (G. M. Thomson). Auckland Islands and New Zealand. (A closely allied species in Graham Land.)
31. *Orchestia serrulata*, Dana. Auckland and Campbell Islands, and New Zealand.
32. *Orchestia aucklandiae*, Spence Bate. Auckland Islands (? New Zealand).
33. *Orchestia bollonsi*, sp. nov. Bounty Island, Snares, Auckland Islands, and New Zealand.
34. *Parorchestia maynei*, sp. nov. Auckland Islands.
35. *Parorchestia insularis*, sp. nov. Campbell Island.
36. *Parorchestia parva*, sp. nov. Auckland Islands.
37. *Parorchestia improvisa*, sp. nov. Snares, New Zealand (Stewart Island).
38. *Parorchestia tenuis* (Dana). Campbell Island and New Zealand.
39. *Hyale hirtipalma* (Dana). Auckland Island, Macquarie Island, New Zealand, South Georgia, and Kerguelen.
40. *Hyale novae-zealandiae* (G. M. Thomson). Snares, Macquarie Island, and New Zealand.
41. *Hyale campbellica* (Filhol). Campbell Island.
42. *Chiltonia mihiwaka* (Chilton). Auckland Islands, Campbell Island, and New Zealand. (Allied species in Victoria and Tasmania.)
43. *Allorchestes novae-zealandiae*, Dana. Auckland Islands, New Zealand (? South America).
44. *Aora typica*, Kröyer. Atlantic, Pacific, and Southern Oceans.
45. *Lembos kergueleni* (Stebbing). Campbell Island, Snares, Macquarie Island, New Zealand, Kerguelen, and Indian Ocean.
46. *Jassa pulchella*, Leach. Cosmopolitan.

Suborder CAPRELLIDEA.

47. *Caprellinopsis longicollis* (Nicolet). Snares, New Zealand, and South America.

Order ISOPODA.

Suborder ASELLOTA.

48. *Janira neglecta*, sp. nov. Auckland Islands and New Zealand.
49. *Iais pubescens* (Dana). All subantarctic seas.
50. *Haliacris neozelanica* (Chilton). Auckland Islands and New Zealand. (An allied species in South Georgia and antarctic seas.)

Suborder FLABELLIFERA.

51. *Cirolana rossii*, Miers. Auckland Islands, Campbell Islands, and New Zealand (? South Africa).
52. *Livoneca novae-zealandiae*, Miers. Antipodes Islands, New Zealand, Australia, Norfolk Island, and South America (? South Africa).
53. *Serolis latifrons*, Miers. Auckland Islands and Kerguelen.
54. *Exosphaeroma gigas* (Leach). All subantarctic seas.
55. *Pseudosphaeroma campbellensis*, nov. gen. et sp. Campbell and Auckland Islands.
56. *Cymodocella tubicauda*, Pfeffer. Auckland Islands, New Zealand, South Georgia, Victoria Land, and Graham Land (? South Africa).
57. *Dynamenella huttoni* (G. M. Thomson). Antipodes Island, Snares, and New Zealand. (A closely allied species in Tierra del Fuego and Kerguelen.)

Suborder VALVIFERA.

58. *Idotea elongata*, Miers. Auckland Islands, New Zealand, and Falkland Islands.
59. *Idotea lacustris*, G. M. Thomson. Campbell Island, New Zealand, and Straits of Magellan.
60. *Paridotea ungulata* (Pallas). Subantarctic seas generally.

Suborder ONISCOIDEA.

61. *Trichoniscus thomsoni* (Chilton). Auckland Islands and New Zealand.
62. *Trichoniscus magellanicus* (Dana). Campbell Island, Auckland Islands, South America, Falkland Islands (? Crozets).
63. *Haplophthalmus australis*, sp. nov. Campbell Island. (A closely allied species in New Zealand.)
64. *Scyphoniscus magnus*, sp. nov. Campbell Island and Auckland Islands. (A closely allied species in New Zealand.)
65. *Deto aucklandiae* (G. M. Thomson). Auckland Islands. (Closely allied species in New Zealand and South America.)
66. *Oniscus punctatus*, G. M. Thomson. Auckland Islands, New Zealand, Tasmania, and Australia.
67. *Cubaris rugulosus*, Miers. Auckland Islands, Campbell Island, and New Zealand.

Order TANAIDACEA.

68. *Tanais novae-zealandiae*, G. M. Thomson. Auckland Islands, Campbell Island, and New Zealand.

Order NEBALIACEA.

69. *Nebalia longicornis*, G. M. Thomson. Subantarctic and antarctic seas.

Subclass CIRRIPEDIA.

Order THORACICA.

70. *Balanus porcatus*, Da Costa. Auckland Islands, Australia, and North America.
71. *Balanus campbelli*, Filhol. Campbell Island.
72. *Balanus decorus*, Darwin. Auckland Islands, New Zealand, and Australia.

Subclass COPEPODA.

Order EUCOPEPODA.

73. *Deguernea antarctica* (G. M. Thomson). Macquarie Island.
74. *Zaus contractus*, G. M. Thomson. Macquarie Island and New Zealand.

Subclass BRANCHIOPODA.

Order CLADOCERA.

75. *Chydorus minutus*, G. M. Thomson. Macquarie Island and New Zealand.

Subclass MALACOSTRACA.

Order DECAPODA.

Suborder REPTANTIA.

Section BRACHYURA.

Genus **Leptomithrax**, Miers, 1876.

Distribution.—Auckland Islands, Tasmania, and Australia.

Leptomithrax australis (Jacq. et Luc.).

Maia australis, Jacquinot et Lucas, Voy. au Pôle sud, Zool., iii, Crust., p. 11, pl. ii, fig. 1, 1853. *Leptomithrax australis*, Miers, Cat. N.Z. Crust., p. 7, 1876; Filhol, "Mission de l'Île Campbell," p. 361, pl. xxxviii, 1885.

Recorded from the Auckland Islands by Hombron and Jacquinot. It occurs also off the southern coasts of New Zealand, and there is a specimen labelled "Dunedin" in the collections of the Canterbury Museum. An allied species, *L. australiensis*, Miers, has been described from Tasmania, and another, *L. spinulosus*, is known from Tasmania and Australia.

Genus **Prionorhynchus**, Jacq. et Luc., 1853.

Distribution.—New Zealand and adjacent islands.

Prionorhynchus edwardsii, Jacq. et Luc.

Prionorhynchus edwardsii, Jacquinot et Lucas, Voy. au Pôle sud, Zool., iii, Crust., p. 8, fig. 1, 1853 ; Filhol, " Mission de l'Île Campbell," p. 367, pl. xlii, figs. 1–4, 1885 ; Hodgson, " Southern Cross " Crust., p. 230, 1902.

This species has been recorded from the Auckland Islands by Hombron and Jacquinot and by Hodgson, and from Campbell Island by Filhol. It is abundant at both islands, and is also found at moderate depths off the coast of Otago and Stewart Island.

Genus **Cancer**, Linn., 1766.

Distribution.—Very widely distributed.

Cancer novae-zelandiae (Jacq. et Luc.).

Platycarcinus novae-zealandiae, Jacq. et Luc., Voy. au Pôle Sud, iii, Crust., p. 34, pl. iii, fig. 6, 1853. *Cancer novae-zealandiae*, Miers, Cat. N.Z. Crust., p. 14, 1876 ; Filhol, " Mission de l'Île Campbell," p. 371, 1885.

One small immature specimen obtained from Musgrave Harbour, Auckland Island, by Professor Benham. Common on the New Zealand coasts. According to Miers, it differs from *C. plebeius*, Poeppig, found on the coast of Chili, only in the somewhat more acute tubercles of the hands and teeth of the antero-lateral margins.

Genus **Nectocarcinus**, A. Milne-Edwards, 1861.

Distribution.—Widely distributed in southern seas.

Nectocarcinus antarcticus, Jacq. et Luc.

Nectocarcinus antarcticus, Jacq. et Luc., Voy. au Pôle sud, Zool., iii, Crust., p. 51, pl. v, fig. 1, 1853 ; Miers, Cat. N.Z. Crust., p. 30, 1876 ; Filhol, Mission de l'Île Campbell," p. 383, 1885 ; Hodgson, " Southern Cross " Crust., p. 229, 1902.

Recorded from the Auckland Islands by Hombron and Jacquinot and by Hodgson. Also found off the coasts of New Zealand.

Genus **Hemiplax**, Heller, 1865.

Distribution.—New Zealand region.

Hemiplax hirtipes, Heller

Hemiplax hirtipes, Heller, Voy. " Novara," Crust., p. 40, pl. xviii, fig. 3, 1865 ; Filhol, " Mission de l'Île Campbell," p. 385, 1885 ; Miers, Rep. " Challenger," xvii, p. 251, 1886.

Recorded from Campbell Island by Filhol. Common on the coasts of New Zealand.

Genus **Halicarcinus**, White, 1846.

Distribution.—Subantarctic seas generally.

Halicarcinus planatus (Fabr.).

Cancer planatus, Fabr., Ent. Syst., t. 11, p. 446, 1793. *Halicarcinus planatus*, White, Ann. & Mag. Nat. Hist., xviii, p. 178, pl. ii, fig. 1, 1846; Miers, Cat. N.Z. Crust., p. 49, 1876; Haswell, Cat. Aust. Crust., p. 114, 1882; Filhol, "Mission de l'Île Campbell," p. 396, 1885; Stebbing, P.Z.S., 1900, p. 524, pl. xxxvi*b*, 1900; Hodgson, "Southern Cross" Crust., p. 231, 1902.

This species was found during the expedition to be very abundant between tide-marks in Perseverance Harbour, Campbell Island; and numerous other specimens were brought to me from various parts of both Auckland and Campbell Islands.

It is evidently a species of wide circumpolar distribution, and has been many times referred to and described under different names, and even yet there are various points of uncertainty that have not been cleared up. A full discussion of most of these will be found in Mr. Stebbing's paper quoted above.

In his "Mission de l'Île Campbell" Filhol has distinguished *H. planatus*, White, and *H. tridentatus* (Jacq. et Luc.) from one another mainly by certain small characters of the tridentate front. This separation of the two species is upheld by Lenz, and by the writer of the account given of the *Crustacea* of the "Mission du Cap Horn." So far as the specimens at my disposal go, they certainly confirm Filhol's statements as to the existence of slight differences between the two forms; and this is also confirmed by the geographical distribution, for all the specimens in my possession from the Auckland and Campbell Islands belong to *H. planatus* as understood by Filhol, while all those from New Zealand itself and from Chatham Island, belong to *H. tridentatus* as described by him. The differences are, however, only slight, and whether they are sufficient for specific separation is another question. Personally, I am, on the whole, inclined to consider the two forms as merely local varieties or subspecies of a widely distributed species. The differences are briefly as follows: In *H. planatus* the posterior lateral tooth on the margin of the carapace is always present and more or less acute, though situated a little below the level of the carapace. In the tridentate front the lateral teeth are somewhat widely separated from the median one, and they are produced a little downwards at the sides, so as to be slightly concave on the inner surface, and in this way a slight recess is formed below the median tooth, in which the antennae rest, and there is practically no ridge on the epistome to divide the recess into two portions. In *H. tridentatus*, on the other hand, the three teeth of the front lie closer together and more in the one horizontal plane, and the lateral teeth are flattened both above and below, so that there is no recess formed below the median tooth, and, on the contrary, there may even be a slight ridge on the epistome. In this form also both the teeth on the lateral margins of the carapace are obsolete, even the posterior one generally showing as little more than a slight projection. These differences, with the exception perhaps of the presence or absence of the posterior marginal tooth, readily escape observation, and naturally they are less marked in immature specimens. Consequently, it is practically impossible to tell from the descriptions of previous authors which of these two forms they had before

them. So far as I can make out, Mr. Stebbing's specimens from the Falkland Islands belong to *H. planatus* as described above, while the forms from Australia which he refers to *H. ovatus*, Stimpson, are probably the same as those from New Zealand which Filhol has described under the name *H. tridentatus;* but unfortunately Mr. Stebbing does not seem to have described the condition of the marginal teeth of the carapace in his specimens. The Cape Horn specimens undoubtedly belong to the true *H. planatus*, and in all probability so do those from Kerguelen Island and from the Cape of Good Hope. If this be so, it would appear that the true *H. planatus* is the subantarctic species of circumpolar distribution, while it is represented in the main islands of New Zealand and in Australia by the variety described by Filhol as *H. tridentatus*. Certainly, all the forms from the mainland of New Zealand that I have seen belong to the latter variety. It is true that Filhol speaks of *H. planatus* as being found on the whole extent of the coast of New Zealand; but here I think he is rather quoting the results of previous authors, who had failed to distinguish between the two varieties, than giving the actual distribution of *H. planatus* as he understood it. Miers indirectly refers to the question in his report of the "Challenger" *Brachyura*, for he distinguishes between *H. planatus* (Fabricius) and *H. ovatus* (Stimpson), and refers specimens from Cape Campbell, New Zealand, to *H. planatus*, while he assigns to *H. ovatus* only some specimens from Australia. If my observations are trustworthy, it is more probable that the Cape Campbell specimens should be referred to *H. ovatus*, if that species is really the same as *H. tridentatus;* and in cases like this, where minute characters are concerned, it is perhaps not desirable to attach too much importance to one single identification made when a large amount of material is being examined.

While it is perhaps rash to hazard an opinion, I strongly suspect that *Liriopea leachii*, Nicolet (=*Hymenosoma leachii*, Guérin), and *L. lucasii*, Nicolet, described in Gay's "Historia de Chile," both belong to *H. planatus* (sens. str.).

Genus **Hymenosoma**, Desmarest, 1823.

Distribution.—Widely distributed in southern seas.

Hymenosoma depressum, Jacq. et Luc.

Hymenosoma depressum, Jacquinot et Lucas, Voy. au Pôle sud, Zool., iii, Crust., p. 62, pl. v, figs. 34–39, 1885; Chilton, Ann. & Mag. Nat. Hist., ser. 7, xix, p. 148, pl. v, figs. 1–4, 1907.

Recorded from Auckland Islands by Hombron and Jacquinot. Also found on the coasts of New Zealand.

Section Anomura.

Genus **Porcellanopagurus**, Filhol, 1885.

Distribution.—Snares and Campbell Islands, Australia, and Juan Fernandez.

Porcellanopagurus edwardsi, Filhol.

Porcellanopagurus edwardsi, Filhol, "Mission de l'Île Campbell," p. 410, pl. xlix, figs. 2–4, 1885; G. M. Thomson, Trans. N.Z. Inst., xxxi, p. 187, 1899.

Originally described from Campbell Island, where it was taken by Filhol. I have one specimen dredged at the Snares in 60 fathoms by Captain Bollons. Filhol's description and figure appear to have been taken from a female specimen. The one I have is a male, and agrees in general with Filhol's description, but has the right chela (fig. 1*a*) very much larger than the left, its propod being about as long as the carapace is wide, the merus triangular, widening distally, and with both the inner and outer lower margins spinose. The carpus is about as broad as long, and is marked on the upper surface with transverse lines of setae arranged in short curves. The propod is somewhat flattened and produced on the inner side so that it is considerably wider than the carpus; the inner margin bears a line of granules, and the upper surface is also finely granular, the granules being more marked towards the margins, and the whole surface bears scattered tufts of short hairs; the movable finger has the upper portion of its surface granular, and bears on the inner edge about five strong blunt teeth, with tufts of hair between the bases of them; the fixed finger has a similar structure. The left chela (fig. 1*b*) has the propod quite small, narrower than the carpus; the fingers slender, their inner margins straight, fitting closely together, and without teeth.

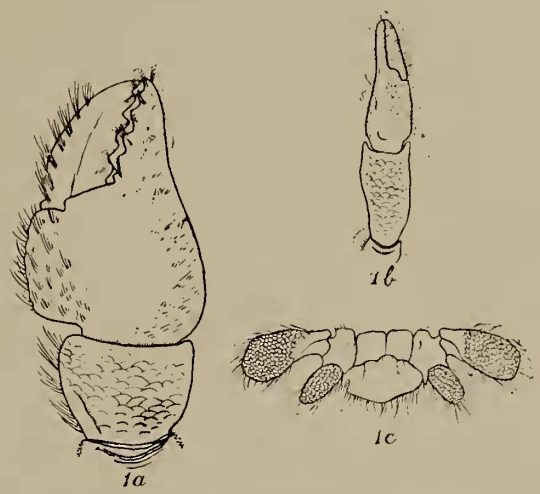

Fig. 1.—*Porcellanopagurus edwardsi*, Filhol.
1*a*. Right chela of male.
1*b*. Left chela of same specimen.
1*c*. Extremity of abdomen of same specimen.

The abdomen is symmetrical, very short, and quite soft, with the exception of the terminal appendages (fig. 1*c*); these have the outer branch longer and broader than the inner, and the upper surface of both roughened with a fine scale-like appearance; the telson is soft, and has the posterior margin rounded.

According to Filhol, this species lives among the marine algae, and does not seek shelter in the empty shells of Gastropods. The structure of the terminal appendages of the abdomen seems to indicate that they are for the purpose of enabling the animal to hold on to its surroundings, and probably the end of the abdomen is inserted into a crevice in the rocks, to which the animal holds on firmly by the roughened surface of its terminal appendages.

Mr. Whitelegge has described a species (*P. tridentatus*), dredged in 54–59 fathoms off the coast of New South Wales, which appears closely related to the above.*

Another species of this genus (*P. platei*, Lenz) has been described from Juan Fernandez.†

* Results "Thetis" Exped., Australian Museum, memoir iv, p. 181.
† See "Zoological Record," xxxix, p. 43 (1902), and Zool. Jahrb., Suppl. v,

Genus **Eupagurus**, Brandt, 1851.

Distribution.—Widely distributed.

Eupagurus campbelli, Filhol.

Eupagurus campbelli, Filhol, "Mission de l'Île Campbell," p. 421, pl. lii, fig. 3, 1885; G. M. Thomson, Trans. N.Z. Inst., xxxi, p. 183, 1899.

Taken by Filhol in Perseverance Harbour, Campbell Island, at a depth of 5 to 6 metres. I have not seen any specimens of this species.

Genus **Munida**, Leach, 1820.

Distribution.—In all seas.

Munida subrugosa (White).

Galathea subrugosa, White, List Crust. Brit. Mus., 1847. *Munida subrugosa*, Miers, Zool. "Erebus" and "Terror," Crust., p. 3, pl. iii, fig. 2, 1874; Hutton, Trans. N.Z. Inst., xi, p. 340, 1879; Henderson, Rep. "Challenger" Anomura, p. 124, 1888; G. M. Thomson, Trans. N.Z. Inst., xxxi, p. 194, 1899; Hodgson, "Southern Cross" Crust., p. 232, 1902; Chilton, Trans. N.Z. Inst., xxxvii, p. 320, 1905. ? *Galathea gregaria*, Fabricius, Ent. Syst., ii, p. 473, 1793. ? *Grimothea gregaria*, Henderson, Rep. "Challenger" Anomura, p. 124, 1888. *G. novae-zealandiae*, Filhol, "Mission de l'Île Campbell," p. 426.

This species is very abundant at the Auckland and Campbell Islands, and is widely distributed in subantarctic seas.

The relationship of *Munida subrugosa* and *Grimothea gregaria* has been the subject of much dispute. Miers suggested that *Grimothea gregaria* is the immature form of *Munida subrugosa*, and the question has been since discussed by Hutton, Henderson, Thomson, Hodgson, and others, without any definite conclusion being arrived at. Hutton was, I believe, the first to point out that the two forms are different in habit, *Grimothea gregaria* being pelagic, while *Munida subrugosa* lives at the bottom of the sea; and he argued from this, and from the fact that small forms are found with the maxillipedes shortened, as in *Munida subrugosa*, that the two species were distinct. Henderson and others have since likewise pointed out that small forms with the characters of *Munida subrugosa* are found, and have similarly upheld the distinction of the two species. The fullest discussion of the question has been given by Thomson, who gives measurements of various individuals, and shows that the difference in the length and development of the external maxillipedes is a comparative one, and that these appendages do not, after all, differ very greatly in the two forms—thus, in *Munida subrugosa* the relative length of the body to that of the external maxillipedes is about 5 to 2, while in *Grimothea gregaria* it is 5 to less than 3. He is therefore inclined to treat *Grimothea gregaria* as merely a stage in the development of *Munida subrugosa*.

My own observations certainly lead me to confirm the measurements made by Mr. Thomson. The difference in the appearance of the external maxillipedes in the two forms is largely due, not so much to their actual size, as to the way in which

they are folded back in *Munida subrugosa*, while they are kept extended in *Grimothea gregaria;* and these positions are naturally associated with the difference in habit of the two forms.

It is true that specimens with the external maxillipedes proportionally short and in-folded as in *Munida subrugosa* are sometimes found which are no larger than some of the specimens of *Grimothea gregaria;* and, on the other hand, large specimens which from their size should belong to *Munida subrugosa* are also met with which have the external maxillipedes elongated and showing the flattened and foliaceous form characteristic of *Grimothea gregaria.* This has already been recorded by Mr. Thomson when he says, "In several large males of *Munida* the joints all show the flattened and foliaceous form characteristic of *Grimothea*, as well as the densely fringing setae, while in one large female the joints are completely foliaceous." Mr. Thomson speaks of these large forms as belonging to *Munida*, and in another place, speaking of the small *Grimothea* form, he says, "Though I have examined hundreds of individuals, I have always found the sexual appendages in a more or less undeveloped condition." From the "Nora Niven" collections I have a number of specimens varying from about 25 mm. in length to 54 mm.; all of these have the external maxillipedes more or less flattened and foliaceous, though their length as compared with the length of the body seems to decrease a little in the larger forms; many of these large forms, however, varying from 35 mm. to 40 mm. in length, are mature females bearing eggs, and would undoubtedly be considered as belonging to *Munida subrugosa* but for the character of their foliaceous maxillipedes, and it is doubtless large specimens of this kind which Mr. Thomson had before him when he made the statement in the first sentence quoted above.

Considering these facts, it would no doubt be the simplest plan to say that there are two species, differing in the form and size of the external maxillipedes, and this is what has been done by Filhol and others. The general resemblance, however, between the forms is so great, and the length of the external maxillipedes varies so much in each form, that I cannot bring myself to agree with this view, but consider we are dealing, after all, only with two forms of one species; and this view seems to be confirmed by the fact that where one form is met with in any particular locality the other is also found somewhere in the neighbourhood. It is, of course, only natural that the immature form should be pelagic in habit, while the mature form inhabits the bottom of the sea; and it seems likely that in this case, just as in some other well-known animals, the immature stage may under certain circumstances be prolonged, and even become sexually mature without completely losing its immature characters. I consider, then, that the foliaceous maxillipedes of *Grimothea gregaria* are associated with its pelagic habit, and that in the absence of favourable circumstances (*e.g.*, a suitable sea-bottom at moderate depth) it may continue pelagic, increase in size, and even become sexually mature without losing its foliaceous maxillipedes; but if it reaches a suitable locality it adopts a more sedentary life at the bottom of the sea, and in subsequent moults the external maxillipedes tend to become shorter and less foliaceous and are in-folded instead of being kept extended as in the pelagic form.

Suborder NATANTIA.

Genus **Nauticaris**, Spence Bate, 1888.

Distribution.—Widely distributed in southern seas.

Nauticaris marionis, Spence Bate.

Nauticaris marionis, Spence Bate, Rep. "Challenger" Macrura, p. 603, pl. cviii, 1888. *Hippolyte stewarti*, G. M. Thomson, Trans. N.Z. Inst., xxi, p. 259, pl. xiii, fig. 1, 1888. *Merhippolyte australis*, Hodgson, "Southern Cross" Crust., p. 223, pl. xxix, 1902. *Nauticaris stewarti*, G. M. Thomson, Trans. Linn. Soc., Zool., viii, p. 445, pl. xxix, fig. 1, 1903. *N. marionis*, Calman, Ann. & Mag. Nat. Hist., ser. 7, xvii, p. 31, 1906.

Two specimens agreeing closely with Mr. Thomson's description of *Nauticaris stewarti* were dredged during the expedition in Perseverance Harbour, Campbell Island. These I have compared with Mr. Hodgson's description of the "Southern Cross" specimens (*Merhippolyte australis*, Hodgson), which were obtained at Auckland Island in 10 fathoms, and can find no reason for continuing to keep the two species separate; and as Dr. Calman, after a comparison of the type specimens, says that Mr. Hodgson's species is the same as *N. marionis*, Spence Bate, it follows that Mr. Thomson's species is also a synonym of this species. Mr. Thomson had himself pointed out that the species were very closely allied, if not identical. Besides the two specimens mentioned above, I have other specimens from Campbell Island, collected by Dr. Cockayne in July, 1903; and also specimens from the Bounty Islands, dredged by Captain Bollons, in 50 fathoms, in October, 1906. Mr. Thomson's type specimen was dredged in Paterson Inlet, Stewart Island, in 10 fathoms.

The species is found also at Marion, Prince Edward, and Falkland Islands, and is therefore circumpolar in distribution.

According to Dr. Calman, who examined two of the type specimens, *Hippolyte magellanicus*, A. Milne-Edwards ("Mission du Cap Horn," Crust., p. F 46) should also be placed under *Nauticaris*, but differs from *N. marionis* in possessing exopods on the third maxillipede.

Genus **Palaemon**, Fabricius, 1798.

Distribution.—Cosmopolitan.

Palaemon affinis (H. Milne-Edwards).

Leander affinis, H. M.-Edwards, Hist. Nat. des Crust., t. ii, p. 391, 1837; Dana, U.S. Expl. Exped., xiii, pl. xxxviii, fig. 5, 1852; Miers, Cat. N.Z. Crust., p. 85, 1876. *Palaemon affinis*, G. M. Thomson, Trans. Linn. Soc., Zool., viii, p. 450, 1903.

Recorded from Campbell Island by Filhol. It is found also in New Zealand, and is a widespread species, being found at the Cape of Good Hope, Australia, Tasmania, and the Falkland Islands.

Order STOMATOPODA.

Genus **Lysiosquilla**, Latreille, 1825.

Distribution.—Widely distributed.

Lysiosquilla spinosa (Wood-Mason).

Coronis spinosa, Wood-Mason, Proc. Asiatic Soc. Bengal, p. 232, 1875.
Lysiosquilla spinosa, Chilton, Trans. N.Z. Inst., xxiii, p. 62, pl. x, 1891.

Recorded from the Auckland Islands by Hutton, under the name *Squilla laevis*. Also known from various parts of New Zealand and from the Andamans (Wood-Mason).

Order AMPHIPODA.

Suborder GAMMARIDEA.

Fam. LYSIANASSIDAE.

Genus **Nannonyx**, G. O. Sars, 1890.

Distribution.—Widely distributed in northern and southern seas.

Nannonyx kidderi (S. I. Smith).

Lysianassa kidderi, S. I. Smith, Bull. U.S. Mus., iii, p. 59, 1876; Stebbing, Rep. "Challenger," xxix, p. 694, 1888. *L. kröyeri*, G. M. Thomson, Trans. N.Z. Inst., xi, p. 237, 1879. *Nannonyx thomsoni* and *N. kidderi*, Stebbing, "Das Tierreich Amphipoda," p. 36, 1906. *Lysianax stebbingi*, G. M. Thomson, Proc. Roy. Soc. Tasmania, 1892, p. 19, pl. iii, figs. 9–18, and pl. v, figs. 9, 10, 1893. *Socarnoides kergueleni* and *S. stebbingi*, Stebbing, "Das Tierreich Amphipoda," p. 47, 1906. "*Lysianassa?*" A. O. Walker, Ann. & Mag. Nat. Hist., ser. 8, xi, p. 34, 1908.

Numerous specimens taken between tide-marks in Perseverance Harbour, Campbell Island, in Carnley Harbour, Auckland Islands, and at the Snares, appear to belong to this species. From the brief description that Mr. Walker gives, they are certainly the same as a single specimen from Auckland Island described by him under the name "*Lysianassa?*" They are also undoubtedly the same as the species common on the coasts of New Zealand which was referred to *Lysianassa kröyeri* (White) by Mr. G. M. Thomson, and which appears in "Das Tierreich Amphipoda" under the name *Nannonyx thomsoni*, Stebbing. Again, on comparing them with *Socarnoides kergueleni*, Stebbing, I found that they agreed on the whole very closely and in some points quite exactly, except that in my specimens the telson was entire or only slightly emarginate at the extremity, while Mr. Stebbing describes and figures the Kerguelen species with the telson fairly deeply cleft. In other respects the telson in my specimens agrees closely with his description, even in the possession of a long and a short plumose seta about the middle of the lateral margin.

This difference between the telsons appeared at first sight to be rather important, and puzzling, considering the close agreement of the two forms in nearly all other respects. The question was also complicated by the fact that the type of *Socarnoides stebbingi* (G. M. Thomson) which I was able to examine agreed closely with my speci-

mens, and this species is placed by Stebbing under the genus *Socarnoides*, as closely agreeing in most respects with *S. kergueleni;* the differences which he points out are, I think, merely due to slight inaccuracies, especially in the drawing of the first side plate, and to the fact that Mr. Thomson's single type specimen is a male, while Mr. Stebbing's description is evidently drawn up from the examination of female specimens. The only points in which there is any real difference are that the outer plates of the maxillipedes are said to have the apex obtusely pointed in *S. kergueleni*, while in *S. stebbingi* they are apically rounded; and that the third uropods in *S. kergueleni* have the inner ramus not much shorter than the outer, while in *S. stebbingi* the inner ramus is described by Mr. Thomson as being "short and quite rudimentary." The first point is not deserving of very much importance, for the outer plate of the maxillipedes is rather delicate, and from an examination of the various specimens it appears that the shape of the apex is subject to some variation, while owing to its delicate nature it is not always easy to dissect it and draw it with accuracy. In the length of the rami of the third uropod, too, there is considerable variation, and after having compared Thomson's type of *S. stebbingi*, in which the inner ramus is perhaps too large to be called "quite rudimentary," with Stebbing's descriptions I have come to the conclusion that this species cannot be distinguished specifically from *S. kergueleni*.

From this it would therefore follow that the Campbell and Auckland Islands specimens are the same as *Socarnoides kergueleni*, Stebbing, as well as being identical with *Nannonyx thomsoni*, Stebbing. There remains, however, the difference in the telson to be considered. However, on turning up some drawings from New Zealand specimens of *N. thomsoni* that I had made many years ago I found that I had drawings showing in one case the telson only very slightly emarginate, while in another is was almost as deeply cleft as in Mr. Stebbing's figure of *S. kergueleni*. The telson is rather short, and curved upwards at the margins and extremity, so that it is concave above, with the lateral margin slightly raised and bearing the two plumose setae about the middle; at the ends the raised margins are slightly produced posteriorly, and usually bear a spine at the posterior angles, and the hind border between them may be straight or slightly emarginate or rather deeply indented—the differences probably corresponding to differences in age. My Campbell Island specimens are all small and probably immature, and in the specimens of them that I have examined the telson has the posterior border either straight or only slightly emarginate. The type specimens of *Socarnoides stebbingi* (Thomson) is now mounted on a slide, and it is impossible to make out the telson clearly, but the postero-lateral angles are distinct, ending in setae, and the hind margin between them is probably somewhat indented.

In his diagnosis of *Socarnoides* Mr. Stebbing says, "telson small, narrowing distally, cleft not reaching the centre, dehiscent"; while in that of *Nannonyx* he says, "telson entire," although certainly some of the specimens of *N. thomsoni* have the telson as much indented as his specimens of *Socarnoides kergueleni*. Again, in the description of *N. goësii* (Boeck), he says of the telson, "apex truncate (notched, Boeck)"; so that in this species also it is probable that there is variation in the telson similar to that in *N. thomsoni*. In the genus *Onisimus*, Boeck, as described by Stebbing, it appears that the telson is entire in some species and incised in others, so that in these two genera it is not safe to include the amount of indentation of the telson as one of the generic characters.

As the result of these considerations it seems clear that *Nannonyx thomsoni*, Stebbing, and *Socarnoides kergueleni*, Stebbing, must be united. The reasons for doing this seem to be confirmed by a consideration of the characters of *Nannonyx kidderi* (S. I. Smith) from Kerguelen Island. In 1888 Mr. Stebbing compared specimens of this species with his *Socarnoides kergueleni*, and apparently considered it as belonging to the same genus and as presenting some resemblance to his species, though he points out various differences, one of the most important of which is that the telson is slightly excavated, not cleft. In 1906, however, he placed Smith's species under *Nannonyx* next to *N. thomsoni*, to which he evidently then considered it to be closely related. The explanation of this apparent inconsistency is, I think, evident—viz., that *Nannonyx thomsoni* and *Socarnoides kergueleni* are both identical with *N. kidderi.*

I think it is extremely likely that *Lysianassa nitens* and *L. australiensis*, Haswell, from Australia, both belong to this widely spread species, *N. kidderi.* Miers has referred various specimens from Australia somewhat doubtfully to *Socarnes kröyeri* (White), a species which was originally described under the genus *Ephippiphora*, and at the same time points out that his specimens are probably nearly related to Haswell's species. It is probable that these specimens examined by Miers also belong to the species now under consideration, but I cannot refer this species to *Ephippiphora kröyeri*, White, as described by Spence Bate in his "Catalogue of the Amphipoda in the British Museum"; and as the type of that species in the British Museum when examined by Miers many years ago was dried, and lacked the appendages that are most desired for comparison, it is perhaps hopeless to endeavour to ascertain now what species was really described under that name by White.

After I had come to the conclusions stated above I was pleased to find that they were to a large extent anticipated and confirmed by Mr. G. M. Thomson, for in a manuscript paper he had already combined *Socarnoides stebbingi* with *Nannonyx thomsoni.*

As this species has already been fully described by various other authors, it is unnecessary to repeat the description here, but I may point out that it can generally be easily recognised by the structure of the third uropods; these are small, but have the peduncle elevated above, either near the middle or towards the distal end, and the produced portion generally tipped with one or more small setae; the rami are both small, the outer with a terminal joint and the inner smaller than the outer. The male differs from the female in having the flagellum of the second antenna about two-thirds the length of the body; the terminal uropoda are the same as in the female, instead of differing, as in many allied species of the *Lysianassidae.*

Genus **Tryphosa**, Boeck, 1871.

Distribution.—Widely distributed in northern and southern seas.

Tryphosa kergueleni (Miers).

Lysianassa kergueleni, Miers, Ann. & Mag. Nat. Hist., ser. 4, xvi, p. 74, 1875. *Tryphosa kergueleni*, Stebbing, "Das Tierreich Amphipoda," pp. 69, 720, 1906; Walker, Nat. Antarct. Exped., Amphipoda, p. 16, 1907. *Hoplonyx kergueleni*, Walker, Journ. Linn. Soc., xxix, p. 51, 1903.

A single specimen from the Snares, dredged in 50 fathoms by Captain Bollons.

The species is now known from Kerguelen, Cape Wadsworth, Cape Adare, and other localities in Victoria Land, and, although not hitherto recorded, it also occurs in New Zealand, for I have specimens from Lyttelton Harbour.

I have been able to compare these and the Snares specimen with specimens in Mr. Thomson's collection from Cape Adare collected during the "Southern Cross" Expedition, and can therefore feel confident about the identification.

Genus **Tmetonyx**, Stebbing, 1906 (= *Hoplonyx*, G. O. Sars, preoccupied).

Distribution.—Northern and southern seas.

Tmetonyx stebbingi (Walker).

Hoplonyx stebbingi, Walker, Journ. Linn, Soc., xxix, p. 52, pl. ix, figs. 52–57, 1903. *Tmetonyx stebbingi*, Stebbing, "Das Tierreich Amphipoda," p. 720, 1906.

I have two small specimens from Musgrave Harbour, Auckland Island, that I think must be referred to this species. They agree with Mr. Walker's description in having the "lateral angle of the head produced to the end of the first joint of the upper antennae, the joint rounded," and in having the fourth segment of the pleon neither dorsally depressed nor carinate and the posterior angle of the third segment not produced into a curved tooth. The eye is somewhat large and reniform; the upper antenna has the first joint very broad and swollen, but the second joint is not very short, being about two-thirds as long as the first but much more slender, the third joint is short; the flagellum is 11-jointed, the accessory appendage small, 4-jointed. The second antenna is very slender, the last two joints of peduncle subequal, flagellum 7-jointed. The first gnathopod agrees in general with Walker's description, but has the palm somewhat more oblique and irregularly defined, with stout setae, and, though the finger has a projection on the inner side, it is not so deeply divided as shown in Walker's figure. In the third uropods the peduncle is slightly produced at the upper distal angle into a subacute point. In other respects the specimen seems to agree closely with the description given by Walker, the few points of difference mentioned above being probably due to immaturity of my specimens. The whole of the body is darkly pigmented, the pigment being unaltered by the spirit.

Walker's species was taken at Cape Adare; another species referred to this genus by Stebbing, *T. cicadoides* (Stebbing), is found at Kerguelen Island, and is perhaps not so different from the present species as might be imagined from a comparison of the descriptions given of the two species.

Fam. Phoxocephalidae.

Genus **Phoxocephalus**, Stebbing, 1888.

Distribution.—In northern and southern seas.

Phoxocephalus kergueleni, Stebbing.

Phoxocephalus kergueleni, Stebbing, Rep. "Challenger," xxix, p. 816, pl. lv, 1888; "Das Tierreich Amphipoda," p. 135, 1906.

I have two imperfect specimens, dredged by Captain Bollons at the Snares, in 50 fathoms, which must, I think, be referred to this species. The gnathopods are

in complete agreement with Mr. Stebbing's description; and the same is true with regard to the other parts of the body and appendages, so far as they can be made out.

The species appears to be very closely related to *P. bassi*, Stebbing, to which I have referred specimens taken with a surface-net in Otago Harbour, and I should not be surprised if the two species prove afterwards to be identical. According to Stebbing, they differ in many points, and the gnathopods alone suffice to distinguish them; his description of *P. bassi* is, however, taken from a single male specimen, and if I am right in referring my New Zealand specimens to this species its gnathopods are hardly so distinct from those of *P. kergueleni* as shown in Stebbing's figure. However, the species in this family are so difficult to distinguish that I prefer to leave the decision of this point over for further investigation.

P. kergueleni was taken by the "Challenger" in Cumberland Bay, in Kerguelen Island, and Mr. Stebbing doubtfully referred to this species a specimen from Marion Island.

Genus **Harpinia**, Boeck, 1871.

Distribution.—Widely distributed in northern and southern seas.

Harpinia obtusifrons, Stebbing.

Harpinia obtusifrons, Stebbing, Rep. "Challenger," xxix, p. 820, pl. lvi, 1888, and "Das Tierreich Amphipoda," p. 143, 1906; Walker, Nat. Antarct. Exped., iii, p. 17, 1907.

Numerous specimens were dredged in 8 fathoms in Perseverance Harbour, Campbell Island—one male with long second antennae and plumose third uropods, many females with short second antennae and third uropods nearly naked. The type specimens are from Kerguelen Island (55–220 m.), and Mr. Walker records the species from the "Discovery" winter quarters in McMurdo Strait.

This species has not been hitherto recorded from New Zealand, having probably been confused with other species of the family; but I have numerous specimens taken in Otago Harbour with surface-net, others from Lyttelton Harbour (4 fathoms, H. Suter), and in Mr. G. M. Thomson's collection there are specimens from the Bay of Islands. These specimens all agree so closely with one another, and also with Mr. Stebbing's descriptions and figures of the "Challenger" specimens, that I have no doubt they are specifically identical; they differ, however, in the following points from the characters of the genus *Harpinia* as given by Stebbing in "Das Tierreich Amphipoda": The eyes are present and well marked, large, oval, black; the second antenna in the male has a long flagellum, and bears calceoli on the terminal joints of the peduncle and also on the flagellum; the third uropods in the male have the rami plumose.

Fam. Liljeborgiidae.

Genus **Liljeborgia**, Bate, 1862.

Distribution.—Northern and southern seas.

Liljeborgia dubia (Haswell).

Eusirus dubius, Haswell, Proc. Linn. Soc. N.S.W., iv, p. 331, pl. xx, fig. 3, 1880. *Liljeborgia haswelli*, Stebbing, Rep. "Challenger," xxix, p. 985,

pl. xcii, 1888; Walker, Journ. Linn. Soc., xxix, p. 60, 1903; G. M. Thomson, Ann. & Mag. Nat. Hist., ser. 7, x, p. 463, 1902; Hutton, Index Faunae N.Z., p. 259, 1904. *L. dubia*, Stebbing, "Das Tierreich Amphipoda," p. 233, 1906; Walker, Nat. Antarct. Exped., iii, p. 35, 1907.

A single small specimen was obtained in rock-pools at the Snares. The species is known from Tasmania and various parts of the east coast of Australia and from New Zealand. Mr. Walker has also recorded it from Cape Adare and from the winter quarters of the "Discovery" in McMurdo Strait. It is probably pretty closely allied to *L. consanguinea*, Stebbing, from Kerguelen and Heard Islands.

Fam. Oedicerotidae.

Genus **Carolobatea**, Stebbing, 1899.

Distribution.—Contains only the following species, from New Zealand and Kerguelen.

Carolobatea novae-zealandiae (Dana).

Oediceros novi-zealandiae, Dana, U.S. Expl. Exped., xiii, ii, p. 934, pl. lxiii, figs. 7 *a–h*, 1853–55. *Halimedon schneideri*, Stebbing, Rep. "Challenger," xxix, p. 839, pl. lix, 1888. *Oediceros novae-zealandiae*, Hutton, Index Faunae N.Z., p. 258, 1904. *O. novi-zealandiae*, Stebbing, "Das Tierreich Amphipoda," p. 270, 1906. *Carolobatea schneideri*, Stebbing, "Das Tierreich Amphipoda," p. 252, 1906.

A few specimens of this species, mostly of small size, were collected at Carnley Harbour, Auckland Island. They agree with a species occasionally taken with the surface-net on the coasts of New Zealand which I had previously identified with tolerable certainty as *Oediceros novi-zealandiae*, Dana. It also agrees very closely indeed with *Halimedon schneideri*, Stebbing, from Kerguelen, though Stebbing's description was taken from a female, probably immature, and does not show the character of the second antenna as it appears in the fully matured male.

In this species there is very great variation in the lengths of the antennae, particularly of the second antennae, and of the fifth peraeopods, according to the age of the animal. In younger specimens both antennae are quite short, and agree well with the description given by Stebbing. In older specimens the upper antenna is somewhat increased in length, and has the flagellum rather markedly thickened, so that most of the joints of the flagellum become nearly as broad as long; the second antenna is longer and more slender, and the flagellum is greatly elongated, until the whole antenna may about equal the length of the body;

Fig. 2.—*Carolobatea novae-zealandiae* (Dana).

2*a*. First gnathopod.
2*b*. Second gnathopod.

the flagellum is very slender, with only a few fine setae, and is about the same width throughout nearly the whole of its length. In the same way the fifth peraeopod becomes greatly elongated in older specimens, so that it may reach far beyond the posterior end of the animal. It appears to be a fully developed specimen of this kind that is figured by Dana, and his figure represents pretty accurately the general appearance of such specimens, although it does not show the projection of the head characteristic of this family. The gnathopods (figs. 2*a* and 2*b*) and other appendages agree very closely with the description given by Stebbing, though in the older specimens the second gnathopod may have the propod more elongated than is shown in his figure.

When examined alive the animal is seen to be almost transparent, with a few slight silvery marks on the back; the eyes are pale pinkish in colour, and appear to be quite coalesced and to occupy the whole front part of the head.

Mr. Stebbing has suggested that *Paracalliope fluviatilis* (G. M. Thomson) is not improbably identical with *Oediceros novi-zealandiae*, Dana; at that time, however, Dana's species had not been rediscovered in New Zealand, and it is evident from what has been already said that the two species are quite distinct.

Fam. Calliopiidae.

Genus **Leptamphopus**, Sars, 1893.

Distribution.—Only two species of the genus known—one from arctic and subarctic seas, the other from antarctic and subantarctic seas.

Leptamphopus novae-zealandiae (G. M. Thomson).

Pherusa novae-zealandiae, G. M. Thomson, Trans. N.Z. Inst., xi, p. 239, pl. x*c*, figs. 2, 2 *a–c*, 1879. *Panoploea debilis*, G. M. Thomson, Ann. & Mag. Nat. Hist., ser. 5, vi, p. 3, pl. i, fig. 3, 1880. *Leptamphopus novae-zealandiae*, Stebbing, "Das Tierreich Amphipoda," pp. 294, 727, 1906. *Oradarea longimana*, A. O. Walker, Journ. Linn. Soc., xxix, pp. 40, 56, pl. x, figs. 77–89, 1903; Nat. Antarct. Exped., Amphipoda, p. 32, 1907; Stebbing, "Das Tierreich Amphipoda," p. 727, 1906; Chevreux, Expéd. antarct. française, Amphipoda, p. 54, 1906.

A single specimen of this species was taken in Carnley Harbour along with *Atyloides serraticauda* and *A. magellanica* (Professor W. B. Benham).

On the whole, this specimen agrees well with Walker's description, but it has only the last segment of the peraeon and the first and second of the pleon dorsally produced. In the first antenna the second joint is produced distally, so as to form a subacute lobe or tooth on each side, as described by Mr. Walker. These lobes allow the third joint to move upon the second in a vertical direction but not laterally, and they thus act as a support to the third joint, guiding and strengthening its movements.

There can be no doubt that Mr. Stebbing was right in pointing out the resemblance between *Oradarea longimana*, Walker, and *Leptamphopus novae-zealandiae* (G. M. Thomson). My specimen from the Auckland Islands is certainly the same as the New Zealand species, and I cannot find any reason for considering it specifically different from Mr. Walker's species. In his later work Mr. Walker has

pointed out that in the New Zealand species as originally described the two posterior segments of the peraeon and the two anterior of the pleon are produced into two teeth, while in *Oradarea longimana* only the first two pleon segments are produced, each into one tooth. Mr. Walker had, however, himself pointed out in his original description that some of his specimens had the first two segments of the pleon simple, and that these characters cannot be relied upon for specific distinctions; the later description by Stebbing speaks of only one tooth on the last segment of peraeon and on each of the first two segments of the pleon, and only one tooth is present in my specimens. It is true that in the New Zealand specimen I cannot find an appendage to the first antenna, while this is present in Mr. Walker's specimens; but, as I have pointed out elsewhere in this paper, the presence or absence of a vestigial accessory appendage on the antenna is subject to considerable variation, and Mr. Walker has himself drawn attention to the same fact.* In the uropoda and in all other characters the resemblance is so close that I feel bound to combine the two species.

Leptamphopus novae-zealandiae evidently has a very wide range, being found in New Zealand, and at Auckland Islands, Cape Adare, McMurdo Strait, and other places visited by the "Discovery"; while M. Chevreux has recorded it also from Flanders Bay, Port Charcot, and Wincke Island.

Djerboa furcipes, Chevreux, from Booth Wandel Island,† shows a striking resemblance to this species in the gnathopoda and in several other respects, but differs in the details of the segments produced into dorsal spines and in having the telson deeply cleft.

Fam. Pontogeneiidae.

Genus **Bovallia**, Pfeffer, 1888.

Bovallia, Pfeffer, Jahrb. der Wissensch. Anstalten zu Hamburg, 1888, p. 96. *Eusiroides*, Stebbing, Rep. "Challenger," xxix, p. 969, 1888.

Distribution.—South Pacific, Indian, and South Atlantic Oceans.

Bovallia monoculoides (Haswell).

Atylus monoculoides, Haswell, Proc. Linn. Soc. N.S.W., iv, p. 327, pl. xviii, fig. 4, 1880. *Eusiroides caesaris*, *E. pompeii*, and *E. crassi*, Stebbing, Rep. "Challenger," xxix, pp. 970, 974, 977, pl. lxxxviii–xc, 1888. *E. monoculoides* and *E. crassi*, Stebbing, "Das Tierreich Amphipoda," pp. 345, 346, 1906. *E. caesaris*, Steb., var. Walker, Rep. Ceylon Pearl Fish., ii, p. 264, pl. iv, fig. 22, 1904. *Bovallia gigantea*, Pfeffer, Jahrb. der Wissensch. Anstalten zu Hamburg, 1888, p. 96, pl. i, fig. 5, 1888; Chevreux, Expéd. antarct. française, Amphipoda, p. 54, figs. xxxi–xxxiii, 1906; Stebbing, "Das Tierreich Amphipoda," p. 357, 1906.

Three specimens from Carnley Harbour, Auckland Island—two of large size (26 mm. in length), the third smaller (Professor W. B. Benham and Mr. E. R. Waite).

* Ann. and Mag. Nat. Hist., ser. 7, vol. xvi, October, 1905, p. 464.

† Expéd. antarct. française, Amphipoda, p. 74, figs. 42–44.

The synonyms given above require some justification, seeing that *Bovallia* and *Eusiroides* are placed by Stebbing in different families. I find that my specimens agree well with Stebbing's description of *E. crassi;* they also agree closely with his description of *E. monoculoides* (Haswell), except that the posterior border of the third segment of the pleon is not serrate, or shows only one or two minute indications of serration. The absence of this serration appears to be the only distinction between these two species, and probably examination of a fuller series of specimens would show that it does not always hold. Under the name "*E. caesaris*, Steb., var.," Mr. Walker has described from Ceylon a form that has only three teeth on the hind margin of the third pleon segment, and thus appears to be intermediate between *E. crassi* and *E. monoculoides*, to the latter of which Mr. Stebbing has now united *E. caesaris*. The supposition that *E. monoculoides* and *E. crassi* are forms of the one species appears to be borne out by the geographical distribution, for the single type specimen of *E. crassi* was taken in the South Atlantic, off Monte Video, at a depth of 600 fathoms, while *E. monoculoides* is already known to be widely distributed in the South Pacific and Southern Indian Oceans, in Australia, and at Heard Island; and one would naturally expect specimens from Auckland Islands to belong to this species rather than to one found only in the South Atlantic, if this were really a distinct species.

From the above considerations I had come to the conclusion that it was inexpedient to continue to look upon *E. crassi* as a species distinct from *E. monoculoides*, from which Mr. Stebbing has himself said that it differs little; and I felt the more justified in combining the two because my specimens, although without distinct dorsal teeth, have the first and second segments of the pleon slightly produced and a little compressed dorsally, and in one specimen the seventh segment of the peraeon shows the same thing to a slight degree, in these respects agreeing with *E. monoculoides* rather than with *E. crassi*. It appears evident that in this species, as in others to which attention has been directed by Walker and other writers, the presence or absence of dorsal teeth on various segments of the body is subject to considerable variation.

After arriving at this conclusion my attention was accidentally drawn again to the figures of *Bovallia gigantea* given by Chevreux, and to the great resemblance which they bore to my specimens; accordingly I compared them carefully with Chevreux's description and figures, and found that they agreed with these quite as well as they had done with Stebbing's description of *E. crassi*. In Chevreux's specimens the last segment of the peraeon and the first and second of the pleon are produced dorsally into teeth, though evidently to a greater degree than shown in my specimens. This difference in degree, however, would naturally be associated with the greater size of the specimens, as his figure was taken from a female measuring 32 mm. in length, while my largest specimen, also a female, measures only about 26 mm. Pfeffer's specimens were even larger, being 45 mm. in length. In my specimens the setae and calceoli are arranged on the antennae in the same general way as described by Chevreux for *Bovallia gigantea*, though they are hardly so numerous; but this, again, is naturally to be expected in smaller specimens. I find a very small one-jointed accessory appendage on the upper antenna, just as described by Stebbing in *Eusiroides*, though in mine it is of still smaller size than in his specimens; in Chevreux's specimens it appears to be absent altogether, as might naturally be ex-

pected in such large specimens. My specimens have the hind margin of the third pleon segment slightly convex, with the lower angle produced into a very short tooth, just as shown in Chevreux's figure of *Bovallia gigantea*. In all other respects I can find no difference between my specimens and those described by Chevreux, and I feel compelled to unite *Bovallia gigantea* and *Eusiroides monoculoides*. It is true that Stebbing in his latest work has placed *Eusiroides* and *Bovallia* in different families, but a comparison of his diagnoses for these families will, I think, show that there is no distinct or constant point of difference between them.

The two genera *Eusiroides* and *Bovallia* were both published in the same year (1888), but as Stebbing in the second volume of his report on the "Challenger" Amphipoda, in which he describes *Eusiroides*, refers to *Bovallia* (see p. 1653) it is evident that the latter genus has priority of publication, and I therefore adopt it, and place it, as Stebbing has done, in the *Pontogeneiidae*.

Mr. A. O. Walker has stated that *Atylus walkeri*, Stebbing (= *A. antarcticus*, Walker),* from Cape Adare and other antarctic localities, is nearly related to *Bovallia gigantea*, Pfeffer, though he gives various differences in the keels on the segments of the body and in other respects. In view of the facts stated above, some of these differences lose much of their importance, and it is quite possible that *A. walkeri* may prove to be near to, or perhaps even identical with, the species now under discussion; the gnathopods, however, as figured by Walker, have the palm less oblique, and Walker makes no mention of the numerous calceoli which are so conspicuous a feature in the descriptions by Stebbing and Chevreux of the forms examined by them.

Genus **Pontogeneia**, Boeck, 1871.

Distribution.—Widely distributed both in northern and in southern seas.

Pontogeneia antarctica, Chevreux.

Pontogeneia antarctica, Chevreux, Expéd. antarct. française, Amphipoda, p. 69, figs. 40, 41, 1906.

Numerous specimens of this species were gathered at Campbell Island and at Carnley Harbour, Auckland Islands, by Professor Benham in February, 1907, and Dr. L. Cockayne had previously given me specimens from the Antipodes Islands.

These agree very closely with M. Chevreux's figures and description. The species is very near to *P. danai* (G. M. Thomson), so common on the coasts of New Zealand, but differs in having every third joint of the flagellum of the upper antenna produced below, and bearing a tuft of sensory setae, while in *P. danai* every fourth joint is produced, and the prominence thus caused is more evident. Chevreux's specimens were from Flanders Bay and Booth Wandel Island.

As at present known, the genus contains, in addition to the two species mentioned above, only *P. inermis* (Kröyer), from the Arctic Ocean and North Sea. Another species, *P. magellanica* (Stebbing), is placed under the genus in "Das Tierreich Amphipoda," but I think it fits better under *Atyloides* (see below, p. 627).

* Journ. Linn. Soc., xxix, p. 58; and Nat. Antarct. Exped., Amphipoda, p. 34.

Genus **Paramoera**, Miers, 1875.

Distribution.—Subantarctic seas generally.

Paramoera austrina (Spence Bate).

Atylus austrinus, Spence Bate, Cat. Amphip. Brit. Mus., p. 137, pl. xxvi, fig. 4, 1862. *Paramoera australis*, Miers, Ann. & Mag. Nat. Hist., ser. 4, xvi, p. 75, 1875. *Atylus australis*, Miers, *l.c.*, xvi, p. 117, 1875; Phil. Tr., clxviii, p. 208, pl. ii, figs. 5, 5 *a–g*, 1879. *Atylus* (?) *australis*, Miers (?), S. I. Smith, Bull. U.S. Nat. Mus., No. 3, p. 61, 1876. *Atyloides australis* and *A. assimilis*, Stebbing, Rep. "Challenger," xxix, p. 914, pls. lxxv, lxxvi, and p. 918, pl. lxxvii, 1888. *Megamoera fasciculata*, G. M. Thomson, Ann. & Mag. Nat. Hist., ser. 5, vi, p. 5, pl. i, fig. 5, 1880, and Trans. N.Z. Inst., xxi, p. 261, 1889; Chilton, Trans. N.Z. Inst., xxxviii, p. 271, 1906. *Maera fasciculata*, G. M. Thomson, Proc. Roy. Soc. Tasmania (1892), p. 28, 1893. *Atyloides australis*, G. M. Thomson, Trans. N.Z. Inst., xxvii, p. 211, 1895. *Maera fasciculata*, Hutton, Index Faunae N.Z., p. 260, 1904; Stebbing, "Das Tierreich Amphipoda," p. 741, 1906. *Paramoera austrina*, Stebbing, "Das Tierreich Amphipoda," p. 363, 1906. *Paramoera austrina*, var. Walker, Ann. & Mag. Nat. Hist., ser. 8, ii, p. 34, 1908. *Stebbingia gregaria*, Pfeffer, Jahrb. Hamburg. Anst., v, p. 110, pl. ii, fig. 7, 1888; Stebbing, Rep. "Challenger," xxix, p. 1654, 1888, and "Das Tierreich Amphipoda," p. 358, 1906; Walker, Nat. Antarct. Exped., Amphipoda, p. 33, 1907. ? *Aucklandia enderbyi*, Walker, Ann. & Mag. Nat. Hist., ser. 8, ii, p. 35, pl. v, figs. 3, 4, 1908.

Numerous specimens of this species were obtained at various localities both from the Auckland Islands and from Campbell Islands; it is recorded also from Macquarie Island by Mr. G. M. Thomson. It is known from Kerguelen Island and elsewhere, and is evidently a very common species in subantarctic regions.

After careful comparison of specimens from various localities, I have no doubt this is the species that has been long known in New Zealand under the name *Megamoera fasciculata*, G. M. Thomson. Through the kindness of Mr. Thomson I have been able to examine a specimen from Tasmania referred by him to this species, and also to compare it with a specimen from Macquarie Island indentified by him with *Atyloides australis*, Miers, and I find that these both belong to the one species.

Mr. Stebbing unites *Atylus megalophthalmus*, Haswell, with this species, though embodying in his description some points mentioned by myself in which it differs from the type. My description was taken from specimens collected in Sydney Harbour (the type locality), and I have no doubt that they belong to *Atylus megalophthalmus*, for they agree very closely with the description and the figures that Mr. Haswell gives of the gnathopods and of the uropods. These specimens I have re-examined, and, though they undoubtedly come very close to *Paramoera austrina*, they appear to differ in the following points: (1.) The head is produced into a rostrum about four-fifths as long as the first joint of the upper antenna. (2.) The appendage

on the first antenna is smaller and less distinct than in typical specimens, and is apparently fused with the last joint of the peduncle, showing only as a slight projection from it. (3.) The carpus of both gnathopods is shorter and more triangular than in typical specimens from the Auckland or Campbell Islands. (4.) The branches of the third uropods are slightly longer and broader, and are more abundantly supplied with setae and long fine hairs, and thus resemble more nearly the uropods of species of *Pontogeneia.*

In the specimens from New Zealand, Auckland Island, Campbell Island, and Macquarie Island there is no rostrum, nor is there one present in the Tasmanian specimen that I have examined; in all of these, too, the appendage on the first antenna is comparatively distinct and well marked.

My specimens agree, on the whole, with the specific description given by Mr. Stebbing in "Das Tierreich Amphipoda," but there is at least one point in the generic description which does not always hold—viz., "Uropods 1 and 2, outer ramus the shorter." This is true for the second uropod; but in the first uropod the outer ramus is hardly, if at all, shorter than the inner one. It appears that in this family of the amphipods particularly there has been an unnecessary multiplication of genera, and consequently some characters have been introduced into the generic description which are subject to individual variation.

Mr. Walker has recorded a variety of this species from Port Ross, Auckland Island, but the points he mentions seem hardly sufficient to establish a new variety, especially as he was able to examine only a single female specimen.

I think there can be no doubt that *Stebbingia gregaria*, Pfeffer, from South Georgia, was based on specimens of *Paramoera austrina* in which the accessory appendage was really absent or was not observed. In 1888 Stebbing was inclined to unite the two, but in 1906 he still keeps them distinct, and recognises *Stebbingia* as a separate genus. The specimens from Kerguelen Island described by S. I. Smith in 1876 under the name "*Atylus* (?) *australis*, Miers (?)," are also shown by Smith's description to belong to this widely distributed and variable species.

On a single "female with ova, length 10 mm.," from Enderby Island, Mr. Walker* has founded a new genus, *Aucklandia*, for which he gives the following diagnosis: "Antenna 1 shorter than antenna 2, with short accessory flagellum. Gnathopods dissimilar. Otherwise as *Paramoera.*"

In his diagnosis of *Paramoera*, however, Stebbing says, "Antenna 1 not longer than antenna 2," and, as a matter of fact, in *P. austrina* it is occasionally somewhat shorter, so that this point is not of sufficient importance to rank as a generic character. As to the next point—"gnathopods dissimilar"—this is also the case to a slight extent in *Paramoera*, though not expressly so stated in Stebbing's diagnosis. Seeing that these are the only two points on which Mr. Walker establishes his genus, and that he says "Otherwise as *Paramoera*," I cannot help thinking that his specimen is only one of *Paramoera austrina* in which the gnathopods are slightly more dissimilar than usual and the palm rather more transverse than is generally the case. The whole of his description applies almost exactly to *Paramoera austrina*, except perhaps with regard to the gnathopoda, and these are not altogether inconsistent with the supposition expressed above.

* Ann. and Mag. Nat. Hist., ser. 8, ii, p. 35, pl. v, figs. 3, 4, 1908.

Genus **Atyloides**, Stebbing, 1888.

Distribution.—Subantarctic and antarctic regions; some species in fresh waters.

Atyloides serraticauda, Stebbing.

Atyloides serraticauda, Stebbing, Rep. "Challenger," xxix, p. 920, pl. lxxviii, 1888; Walker, Journ. Linn. Soc., xxix, pl. ii, fig. 90, 1903; Chevreux, Expéd. antarct. française, Amphipoda, p. 87, 1906; Walker, Nat. Antarct. Exped., Amphipoda, p. 33, 1907.

A few specimens of this species were taken along with *Atyloides magellanica* in Carnley Harbour, Auckland Islands (Professor W. B. Benham). Stebbing's original species was taken "off Melbourne." Mr. Walker records this species from Cape Adare and Cape Wadsworth, and M. Chevreux has examined specimens from Flanders Bay, so that the species is evidently widely distributed in antarctic and subantarctic seas.

My specimens agree well, on the whole, with Stebbing's description, particularly as regards the telson; but in some of them the posterior margin of the third pleon segment is almost smooth, and it is evident, as Mr. Walker has pointed out, that the number of teeth on this margin is subject to variation. In this species, as in many others, the southern specimens appear to be larger than those found further north: mine do not measure more than about 6–8 mm., while the largest from Cape Adare was 15 mm. in length. This species bears a very close general resemblance to *A. magellanica* (Stebbing), and must be placed in the same genus. I doubt if there is any good reason for retaining the genus *Atyloides* as distinct from *Paramoera*, though I follow Stebbing, and retain it at present. *A. serraticauda* seems to differ from *A. magellanica* only in having both pairs of gnathopods much longer and more slender, and at one time I was inclined to consider the two as forms of one species—as, indeed, they may really be. My specimens of the two species were taken together, and it is worthy of note that during the "Discovery" Expedition the two species were taken from places not very far apart, and during the French Antarctic Expedition of 1903–5 both species were collected at Flanders Bay.

Atyloides magellanica (Stebbing).

Atylopsis magellanica, Stebbing, Rep. "Challenger," xxix, p. 925, pl. lxxix, 1888. *Pontogeneia magellanica*, Stebbing, "Das Tierreich Amphipoda," p. 360, 1906; Walker, Nat. Antarct. Exped., Amphipoda, iii, p. 33, pl. xii, fig. 20, 1907; Chevreux, Exped. antarct. française, Amphipoda, p. 64, figs. 37–39, 1906.

A few specimens of this species were taken in Carnley Harbour along with *A. serraticauda*, Stebbing.

These agree well with the description given by Chevreux, and also with that given originally by Stebbing, though in his specimen the antennae were wanting. My specimens, however, have a small one-jointed accessory flagellum on the upper antenna. Chevreux says that in his specimens there is no appendage; but, as pointed out elsewhere, this difference is not sufficient to rank as a specific distinction. In all other respects my specimens agree very closely with Chevreux's description, and the telson and third uropod in particular appear identical with the

form figured by him. The gnathopods, which are considerably elongated, also agree well with the figure given by Walker for this species; but, on the other hand, he figures the telson with the sides somewhat convex and free from setae.

This species, though originally placed by Stebbing under *Atylopsis*, was afterwards transferred by him to *Pontogeneia*, and in this he is followed by both Walker and Chevreux. It appears evident, however, from Chevreux's description that the joints of the flagellum of the upper antenna are not produced at every third or fourth joint, as in the other species of *Pontogeneia;* and, moreover, the telson hardly agrees with that found in these species, since in them the two terminal lobes of the telson are rounded and without setae. In my specimen there is a very slight widening of the alternate joints of the flagellum of the upper antenna, similar to that in *Paramoera austrina*, but to a much less degree. These points, together with the fact that the upper antenna may possess a one-jointed accessory appendage, seem to me to show that the species comes nearer either to *Atyloides* or *Paramoera*, if, indeed, these two genera are to be kept distinct, and for the present I leave it under *Atyloides*.

Chevreux has described under this genus a species, *A. longicornis*, which appears to be closely allied to *A. magellanica*, though the telson is rather more like that of *A. serraticauda*. In many respects both *A. magellanica* and *A. longicornis* come very close to *Paramoera austrina* (Spence Bate), and at one time I was inclined to place *A. magellanica* under *Paramoera;* but it differs from typical specimens of *P. austrina*, the only species of that genus, in having the gnathopods longer and more slender, and in possessing fewer long setae on the antennae.

Atyloides aucklandicus, Walker.

Atyloides aucklandicus, Walker, Ann. & Mag. Nat. Hist., ser. 8, ii, p. 33, pl. v, figs. 1, 2, 1908.

Several specimens were collected by Professor W. B. Benham from a small fresh-water pool on Enderby Island into which a small stream emptied. In the stream were found specimens of *Chiltonia mihiwaka* (described below), the present species having been found in the pool itself.

I refer these specimens with some hesitation to Mr. Walker's species. In most respects they agree with his description, but his account is hardly detailed enough to make one quite certain of identifying a species in this family, where there is such a close resemblance between all the members; moreover, as there is no statement to the contrary, Mr. Walker's specimens are presumably marine. I am extremely doubtful whether the young imperfect specimen which he mentions really belongs to the same species as his other two specimens.

My specimens agree well with the generic description of *Atyloides* given by Stebbing, except that the gnathopods can hardly be called slender. From Mr. Walker's description my specimens differ in the following points: (1.) The hind margin of the third pleon segment is almost straight (not convex); the posterior angle forms a right angle and is not produced into a small tooth, but the minute denticle or seta is present above it. (2.) The eyes are not visible. (3.) The first maxilla has the inner plate fringed with numerous setae, about eighteen or twenty—not seven, as described by Walker. (4.) The telson is deeply cleft, each portion narrowing distally and with the posterior end rounded; the outer margin bears

about five or six small setae, one or two being situated at the rounded end; in Mr. Walker's specimens each half bears only two setae.

The flagella of both antennae bear calceoli on the proximal joints. The gnathopods are described below and shown in the figures, and the rest of the animal calls for no further detailed description.

Figure 3*a* shows the first gnathopod. The side plate is slightly narrowed and rounded below, the margin bearing two or three fine setae; the basos is as long as the rest of the limb, its posterior margin bears five or six very long setae; the ischium has a small tuft of setae on its posterior margin near the extremity; the merus is rounded posteriorly, and bears near its angle a transverse row of eight or nine stout setae, with others on its posterior margin towards the end of the joint. The carpus is rather longer than the propod, its anterior margin with two or three setae and a small tuft at the distal angle; the posterior margin bears three transverse rows of setae, the number in each row increasing towards the distal end of the joint; the propod is oblong, the breadth more than half its length; anterior margin rather convex, with a few setae on the distal half, and a tuft at the base of the finger; posterior margin with three short transverse rows of setae similar to those on the carpus, and a small tuft on the outer surface some distance from the margin; the palm is transverse, straight, and bears four short stout setae near the point where the tip of the finger impinges; the finger is nearly straight, and fits closely on to the palm.

Fig. 3.—*Atyloides aucklandicus*, Walker.

3*a*. First gnathopod of female (outer side).
3*b*. Second gnathopod of female (outer side).

The second gnathopod (fig. 3*b*) is similar to the first, but slightly larger; the carpus is fully as long as the propod, and bears on its posterior margin four transverse rows of setae, and there are also four rows on the posterior margin of the propod.

Mr. O. A. Sayce has described two species of *Atyloides* from the fresh waters of Victoria. Of one of these, *A. gabrieli*, I have been able to examine specimens kindly sent me by Mr. Sayce. It comes close to the species now under discussion, which, however, differs in the following points: The antennae bear fewer and smaller tufts of long hairs than those found in *A. gabrieli;* the inner lobe of the first maxilla bears numerous plumose setae, instead of only three; the second joint of the palp of the mandible is less broadened; the gnathopods are rather less slender, and apparently have the posterior margin of the fifth joint less produced; and the palm is considerably more transverse than in *A. gabrieli*.

Mr. Sayce has also described another species, *A. fontana*, which in some of these points approaches more nearly to the one from Auckland Islands, for the antennae do not bear the tufts of long setae, the second joint of the palp of the mandible is less expanded, and the inner lobe of the first maxillae bears numerous setae.

Fam. Gammaridae.

Genus **Parapherusa**, Stebbing, 1906 (=*Harmonia*, Haswell: see "Das Tierreich Amphipoda," p. 383).

Distribution.—Contains only the following species, which is known from Australia, New Zealand, and Antipodes Island.

Parapherusa crassipes (Haswell).

Harmonia crassipes, Haswell, Proc. Linn. Soc. N.S.W., iv, p. 330, 349, pl. xix, fig. 3, 1879; Chilton, Trans. N.Z., Inst., xv, p. 82, pl. ii, fig. 5 *a*, *b*, 1883; G. M. Thomson, Trans. N.Z. Inst., xxi, p. 261, 1888. *Parapherusa crassipes*, Stebbing, "Das Tierreich Amphipoda," p. 383, 1906.

A small female specimen was collected at Antipodes Island by Dr. L. Cockayne in July, 1903.

I do not feel certain about the systematic position of this species, but pending further investigation I leave it under the *Gammaridae*, where Stebbing has placed it.

Genus **Melita**, Leach, 1813–14.

Distribution.—In all seas.

Melita inaequistylis (Dana).

Amphithoe (*Melita*) *inaequistylis* and *A. tenuicornis*, Dana, P. Amer. Ac., ii, pp. 214, 215, 1852. *Melita tenuicornis*, Dana, U.S. Expl. Exped., xiii, ii, p. 963, pl. lxvi, figs. 5 *a–m*, 1853 and 1855; G. M. Thomson, Trans. N.Z. Inst., xiii, p. 218, 1881; Chilton, Trans. N.Z. Inst., xxxviii, p. 271, 1906. *Melita inaequistylis*, Stebbing, "Das Tierreich Amphipoda," p. 429, 1906. *Maera tenuicornis*, Sp. Bate, Cat. Amphip. Brit. Mus., p. 195, pl. xxxv, fig. 6, 1862; Walker, Rep. Ceylon Pearl Fish., pt. ii, p. 273, pl. v, fig. 33, 1904. *Melita zeylanica*, Stebbing, "Spolia Zeylanica," ii, pt. v, p. 22, pl. v, 1904.

Several specimens from Carnley Harbour, Auckland Islands (Professor W. B. Benham).

This species is widely distributed in New Zealand, where it is met with both on the open coast and also in lagoons and estuaries where the water may at times be quite fresh. It is readily recognised both by the peculiar characters of the gnathopods of the male and also by the colour, which is either slaty or greenish-brown, and remains unchanged for a long time in spirit. Mr. Stebbing, in "Das Tierreich Amphipoda," points out that Dana's and Thomson's statements with regard to this species are in many respects contradictory. This, however, is merely due to the fact that Dana described the species as being without an accessory appendage to the first antenna, and to other errors in his description and figures. In 1904 Mr. A. O. Walker recorded this species from Ceylon, though pointing out one or two respects in which his specimens differed from Dana's description, the chief being that the first and second peraeopods were as long as the last two pairs, while in Dana's description and figure the last two are much the longer; Mr. Walker's specimens were doubtless immature

(he gives the length as 5 mm.), for in such specimens the various peraeopods are of more uniform length, while in fully developed specimens the last two pairs are, as described by Dana, much longer than the others. In the same year Mr. Stebbing described a new species, *Melita zeylanica*, also from Ceylon, which he could not reconcile with Dana's description and figures. From a comparison of his description with that given by Walker and with the New Zealand specimens, there can, I think, be no doubt, however, that Stebbing's species is the same as Dana's, the colour and gnathopods especially being practically identical.

Some of the confusion has no doubt arisen from the fact that the first and second gnathopods of the male vary considerably, according to the state of their development: thus, in immature specimens the first gnathopod has the finger attached to the propod in the normal way, and the gnathopod does not then differ very much from the corresponding appendage in the female; in fully matured specimens, however, the end of the propod is somewhat excavate, the finger is attached about the middle of the distal extremity, it is much curved, and the postero-distal angle of the propod is produced into a rounded setose lobe against which the finger impinges. In the same way the peculiar characters of the second gnathopod, with the finger curved in on its inner concave surface, are attained only in fully adult males; in younger forms this gnathopod is much more like that of the female, though it may have the propod much larger in proportion to the size of the body. There can be no doubt that Stebbing is right in saying that the figure which Dana labels as the female is shown from the form of its second gnathopod to be a male; the other figure, labelled "Male," has the second gnathopod larger than it usually is in the female, and was probably taken from a somewhat immature male, though Dana considered it to be the female, and accidentally transposed the sex signs in his plate. The teeth on the terminal segment of the pleon appear to be somewhat variable: in young specimens these segments are quite smooth; in others they have teeth on the fourth and fifth segments, as described by Walker; while in others again I have been able to find them only on the fifth.*

This species appears to bear in colour and in other respects a very close resemblance to *M. palmata* (Mont.), about which there seems to have been the same confusion as regards the shape of the first gnathopod, but it differs from that species in the shape of the second gnathopod in the male. *M. inaequistylis* is now known to occur in New Zealand, the Auckland Islands, and in Ceylon, and therefore must have a very wide range in southern seas.

Dana had originally described two species, *Amphitoe* (*Melita*) *inaequistylis* and *A.* (*Melita*) *tenuicornis*, though afterwards uniting them as the two sexes of one species under the name *Melita tenuicornis*, and this name has been used for the species until a few years ago. Stebbing has, however, revived the name *M. inaequistylis*, according to the rule of page precedence, and I have also used this name in order to avoid further confusion; but, seeing that Dana himself and all subsequent writers had referred to the species as *M. tenuicornis*, I think it is a pity that the name *M. inaequistylis* was not allowed to remain in the oblivion in which it had long been resting.

* Canon A. M. Norman has called attention to a similar variability in the sculpturing of the posterior margins of the pleon in *M. obtusata* (Montagu): Ann. and Mag. Nat. Hist., ser. 6, iv, 1889, p. 132.

Fam. Dexaminidae.

Genus **Paradexamine**, Stebbing, 1899.

Distribution.—New Zealand, Australia, and Graham Land.

Paradexamine pacifica (G. M. Thomson).

Dexamine pacifica, G. M. Thomson, Trans. N.Z. Inst., xi, p. 238, pl. x*b*, fig. 4. *Paradexamine pacifica*, Hutton, Index Faunae N.Z., p. 259, 1904; Stebbing, "Das Tierreich Amphipoda," p. 518, 1906; Calman, Ann. & Mag. Nat. Hist., ser. 8, i, p. 233, 1908.

A few specimens of this species were taken in Carnley Harbour, at a depth of 2 fathoms. They are identical with specimens from Port Chalmers, Lyttelton, and other parts of New Zealand, where the species is quite common. It is also known from the east coast of Australia. Monsieur Chevreux, in his report on the *Amphipoda* of the French Antarctic Expedition, has described a species of this genus from Booth Wandel Island, and also from Port Charcot, which appears to approach very nearly to our New Zealand species. According to Monsieur Chevreux, however, his species differs in having a dorsal median carina on the last two segments of the peraeon and on the first segment of the pleon; also, in the greater length of the lower antennae, and in having the propod of the last pair of peraeopoda only about half as long as the carpus. In his specimens, too, the last uropods are longer, and surpass the length of the telson.

Fam. Talitridae.

Genus **Orchestia**, Leach, 1813–14.

Distribution.—On all shores throughout the world.

Orchestia serrulata, Dana.

Orchestia serrulata, Dana, P. Amer. Ac., ii, p. 204, 1852, and U.S. Expl. Exped., xiii, ii, p. 870, pl. lviii, figs. 7 *a–b* (♂), *m–o* (♀?), 1853 and 1855. *O. serrulata* (part), Stebbing, "Das Tierreich Amphipoda," p. 535, 1906.

I have numerous specimens of this species from several localities in the Auckland Islands and in Campbell Island. It is also found in various parts of New Zealand, particularly in the south.

Some of the specimens from the islands attain a large size, the males reaching as much as 40 mm. in length of body. These specimens undoubtedly belong to this species as described by Stebbing. It appears to be well characterized by the ridges or corrugations on the segments of the body (though these, of course, are best-marked only in the older males), by the shape of the second gnathopod of the male, by the character of the fifth peraeopod, and by the comparative absence of spines on the body and appendages.

Stebbing united *O. aucklandiae*, Spence Bate, with this species. I have, however, as explained below, specimens which certainly agree well with Spence Bate's species, but have no sign of ridges or corrugations even in large males, and, as there appear

to be these two forms, it is perhaps best to keep them as separate species, though they are certainly very closely related. There is nothing mentioned in either Dana's or Spence Bate's descriptions about the corrugations. I am therefore following Stebbing in referring the corrugated form to *O. serrulata*, Dana.

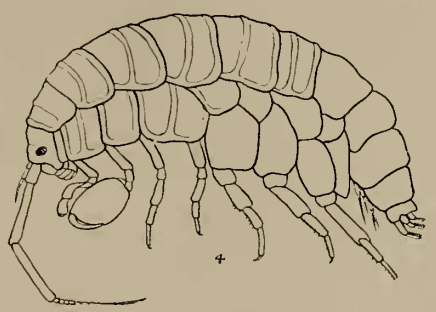

Fig. 4.—*Orchestia serrulata*, Dana. Side view of a large male.

The distinctive characters of this species are to be seen only in fully adult males, the females and the immature males being very difficult to distinguish from those of other closely allied species of the genus. In the fully developed males the second antenna is about half the length of the body, with the peduncle smooth and somewhat angular in section, its last two joints very long; the flagellum contains about twenty joints, and may be slightly longer than the peduncle, though often somewhat shorter; the whole appendage is smooth, being almost free from setae. The second gnathopod of the male (fig. 5*b*) has the propod very largely developed, nearly as broad as long, the palm nearly transverse, and defined by a stout sharp tooth, on the inner side of which the finger impinges; near the base of the finger the palm is deeply hollowed out, and near the middle it is produced to a subacute tooth, from which it extends almost straight to the defining-tooth; the finger is strongly curved, so that its inner margin is very concave; a few short setae are present on the basos and on the palm, but the rest of the joint is almost quite smooth. In the fifth peraeopod (fig. 5*c*) the basos has the posterior flat expansion somewhat narrow, its posterior margin being straight or only very slightly convex and only obscurely serrate, and the lower angle is produced into an acute process reaching beyond the extremity of the ischium; the distal end of the merus is deeply concave, the anterior angle being produced into a distinct tooth, curving slightly inwards, the posterior angle being much less produced; the carpus is slightly longer and considerably broader than the propod, and both bear a few short setae on the anterior margin; the finger is short and stout.

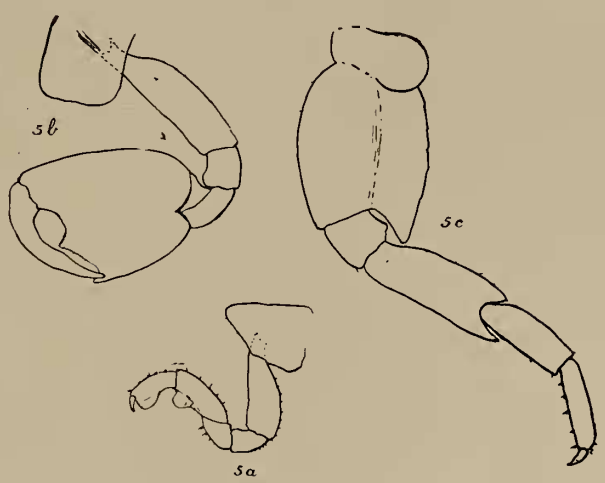

Fig. 5.—*Orchestia serrulata*. Dana.

5*a*. First gnathopod of large male.
5*b*. Second gnathopod of large male.
5*c*. Fifth peraeopod of large male.

In younger males the setae on the various appendages are much more prominent, the antennae are shorter in proportion to the length of the body, the second gnathopod has the propod smaller and the palm much straighter and the finger less curved; in the fifth peraeopod the basos has the posterior expansion slightly wider in proportion to the length of the joint, its posterior margin somewhat convex and more distinctly serrate, and the lower angle less produced,

forming often only a right angle; the merus is less broadened, and its distal extremity more of the usual shape.

The females agree with the younger males in all these points, and apparently differ only in the gnathopods: in the first gnathopod the propod is about the same width throughout, with the palm very small and the finger projecting beyond it; the second gnathopod presents no distinct features.

Orchestia aucklandiae, Spence Bate.

Orchestia aucklandiae, Spence Bate, Cat. Amphip. Brit. Mus., p. 17, pl. ia, fig. 3, 1862; G. M. Thomson, Trans. N.Z. Inst., xxxi, p. 201, 1898; A. O. Walker, Ann. & Mag. Nat. Hist., ser. 8, ii, p. 36, 1908. *Orchestia serrulata* (part), Stebbing, "Das Tierreich Amphipoda," p. 535, 1906.

Several specimens, both male and female, from Enderby Island are certainly the same as those from the same locality referred to this species by Mr. Walker, and I think he is right in referring them to Spence Bate's species. They agree well with the description given by Mr. Walker, and, although they come very close to the preceding species, they differ from it in the absence of the transverse ridges or corrugations on the segments of the peraeon even in large specimens, for some of the specimens are larger than specimens of the preceding species in which these transverse ridges are nevertheless present. The females have the distal end of the first gnathopod as wide or slightly wider than the base, and thus agree with the description given by Mr. Walker, and differ from that given by Mr. Stebbing for *O. serrulata*.

I am therefore following Walker in considering these specimens to belong to a species distinct from *O. serrulata*, though I quite realise that good reasons may be urged for combining the two.

Mr. Walker states that his specimens might well be referred to *O. gammarellus*, Pallas," but for the absence of the expansion of the fourth and fifth joints of peraeopod 5," and he adds that it is by no means certain that his specimens were sexually adult. Some of my specimens are adult females bearing eggs, and the largest males measure about 24 mm. in length, and are most probably also adult; but in none of them is there any sign of the expansions referred to.

The second gnathopods of the male vary considerably in the appearance of the margin of the palm, according to age; but even in the largest specimens the excavation near the base of the finger is not great, while in younger specimens the palm is almost straight and the finger fits closely along it. Spence Bate describes the finger as being "excavated near the base," but this appearance is rather due to a curvature of the finger at that point, so that the inner margin becomes concave; in younger specimens the finger is straighter. The fifth peraeopod closely resembles that of the preceding species in having the posterior expansion of the basos angular and produced downwards, the amount of this downward production varying greatly with the age and sex of the specimen, in young males and in females the lower inferior angle being a right angle; the posterior margin is straight or slightly convex and more or less serrulate, and the whole of the posterior expansion is clearly marked off on the outer side from the thicker anterior portion of the basos. The end of the merus is excavated, and the anterior and posterior margins produced downwards into two short spines, the anterior one being the longer, these spines being better

marked in the older and larger specimens. The structure thus formed at the end of the merus is, however, much less marked than in the large specimens that I have referred to the two species *O. serrulata* (Dana) and *O. bollonsi*, sp. nov.

In this species, as in *O. serrulata* and *O. bollonsi*, the carpus of the fifth peraeopod bends outwards on the merus so that when bent it lies almost at right angles to the general longitudinal line of the body; it then rests on the ground, and the spinous processes on the end of the merus can be pressed into the sand, and the animal is thus enabled to stand firmly when walking or preparing to leap by suddenly extending the pleon.

Orchestia bollonsi, sp. nov.

Male.—In general, like *O. serrulata*, but with all segments of the body quite smooth; the third pleon segment with the hind margin serrate and provided with short setae, the posterior angle a right angle or a little produced. The second antennae only about one-third the length of the body. The second gnathopod (fig. 6*b*) with propod greatly enlarged, palm somewhat oblique, defining-tooth long and acutely pointed; a round prominence on the palm towards the base of the finger, from which it is separated by a slight depression; from this prominence the palm proceeds almost straight towards the defining-tooth, but is separated from it by another narrow depression; a few short setae along the borders of the palm; the finger somewhat curved, with a very slight enlargement opposite the middle of the palm. Fifth peraeopod (fig. 6*c*) with the posterior expansion of the basos somewhat narrow, the posterior margin obscurely serrate and usually somewhat concave about the middle, the lower angle produced downwards into an obtuse lobe reaching considerably beyond the end of the ischium, the margins of this lobe being obscurely serrate like the posterior margin; merus with the distal end deeply hollowed, the anterior angle produced into a long sharp tooth curved inwards, posterior angle broader and less produced; carpus about as long as the propod but considerably broader; a few short setae present on the merus, carpus, and propod.

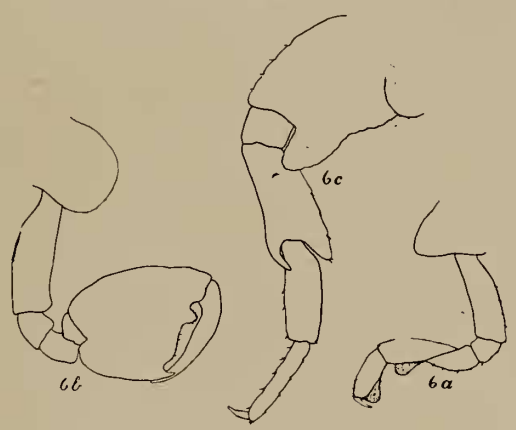

Fig. 6.—*Orchestia bollonsi*, sp. nov.

6*a*. First gnathopod of male.
6*b*. Second gnathopod of male.
6*c*. Fifth peraeopod of male.

Female.—First gnathopod similar to that of *O. serrulata*, but with the propod slightly enlarged at its distal end; the fifth peraeopod not showing the special characters described in the male to the same degree.

Length of largest specimens, about 28 mm.

Hab.—Bounty Islands, under guano (Dr. L. Cockayne, July, 1903); Snares (Chilton, 11th November, 1907); Ewing Island (J. B. Mayne, November, 1907).

Type in the Canterbury Museum, New Zealand.

It is only with great hesitation that I propose this new species; but the specimens from Bounty Island are specially large and well marked, and, as they are the first *Orchestia* gathered from that island, it may cause less confusion to give them a

new name provisionally rather than to endeavour to identify them with any of the species already described. The fully developed males are easily recognised, but more immature males have the second gnathopoda smaller and with the palm nearly straight, and are then difficult to distinguish from the forms I have referred to *O. aucklandiae*, Bate. As stated below, I have specimens from the Snares and from Ewing Island that are evidently very close to the Bounty Island specimens; they differ, however, in being of smaller size and in having a more distinct enlargement on the middle of the inner margin of the finger—in the Bounty Island specimens there is only a faint indication of such an enlargement. I have similar specimens gathered in Preservation Inlet and other places in south-west Otago. Some of these seem to me to approach *O. chiliensis*, M.-Edwards.

From the Snares and Ewing Island I have a considerable number of specimens, gathered at the roots of tussocks near the shore. In most respects these agree with the characters of *Orchestia bollonsi* as described above. None of them are of large size, the largest being about 16 mm. in length, yet most of them show the characteristic shape of the basos of the fifth peraeopod. They differ from the Bounty Island specimens referred to this species in the following points: The second gnathopod in the male has the palm rather more oblique; the rounded projection on the palm near the base of the finger is smaller and is followed by a rather deep but somewhat narrow depression; the palm thence proceeds almost straight to the acutely pointed defining-tooth. The finger is considerably curved, and bears on its inner margin an enlargement which nearly corresponds in position to the depression in the centre of the palm.

The females have the propod of the first gnathopod only very slightly expanded at the extremity, in this respect closely resembling the specimens of *O. serrulata* as described by Stebbing. None of the specimens show any sign of ridges on the segments of the body.

This species is named after Captain Bollons, to whom I am indebted for many species from the islands.

Genus **Parorchestia**, Stebbing, 1899.

Distribution.—A genus of terrestrial *Amphipoda* of wide distribution.

Mr. Stebbing describes this genus as "like *Orchestia*, but maxillipeds with fourth joint of palp distinct though very small, conical, and having a spine on the truncate apex."

In *Orchestia*, however, the maxillipedes may, as Stebbing himself states, have an obscure rudiment of the fourth joint of the palp, and the presence or absence of this joint is therefore hardly sufficient to distinguish the two genera. At the same time, it is perhaps convenient to group the truly terrestrial species under a separate genus, and the species that I am acquainted with can, as a rule, be distinguished from species of *Orchestia* living on the sea-shore by the greater abundance of long slender spinelike setae on the antennae and the peraeopods, and by the more reduced condition of the pleopoda, especially of the third pair. Terrestrial amphipoda living far away from the sea are already known to be very widely distributed, being found in New Zealand and the adjacent islands, Australia, America, the Hawaiian Islands, and other islands in the Pacific; while others, again, are known from various islands in the Indian Ocean.

Some of these species have been referred to *Parorchestia*, others to *Talitrus*, and others again to *Orchestia;* and in some cases the same species appears to be very widely distributed: thus, *Orchestia platensis* Kröyer has been recorded from Rio de la Plata, in South America; the Atlantic coast of North America; Bermudas; the Mediterranean; the Lake of Tiberias, in Palestine; from the Hawaiian Islands, where it is found at a height of 3,000 ft.; and Mr. Walker has even recorded it from the Mahlosmadula Atoll, in the Indian Ocean, at a depth of 20 fathoms in the sea.* Some of these identifications, however, appear to have been founded only on female specimens, and, as is well known, it is in many cases almost impossible to distinguish species of this group by the females alone.

In this paper I describe four new species of *Parorchestia*, three of which are distinguished by the characters of the adult male; with two of these it is practically impossible to distinguish the females from one another or from those of *P. sylvicola*, the species so abundant on the main islands of New Zealand. It may be, of course, that in this instance we are dealing with one widely spread species with polymorphic males; but, as the forms so far as is at present known are confined to separate islands, I prefer to look upon them in the meantime as distinct species.†

The fourth species, *P. improvisa*, of which only the female is known, is remarkable for having the propod of the first gnathopod enlarged and completely subchelate and similar to that of the second gnathopod of the males in other species, though developed to a less degree.

Parochestia maynei, sp. nov.

Male.—Body moderately compressed, side plates not very deep, fifth as deep as the fourth, pleon segments with the lower margins somewhat rounded, posterior angle of the third quadrate. Eyes round, as far apart as their width. First antenna reaching to the end of the fourth joint of peduncle of the second, its third joint much longer than the first or second, which are subequal; flagellum six-jointed, as long as the third joint of peduncle. The second antenna slender, more than half as long as the body; fifth joint of peduncle one and a half times the length of the fourth, bearing a few fine setae; flagellum rather longer than peduncle, about thirty-jointed, joints rather longer than broad, slightly expanded distally, each with four stiff setae longer than the joint is wide. First gnathopod (fig. 7*c*) with basos slender; merus with a slight pellucid enlargement at the distal end; carpus considerably longer than the propod, its posterior margin produced into a rounded pellucid lobe, the

* "The Fauna and Geography of the Maldive and Laccadive Archipelago," vol. ii, Supplement 1, Amphipoda, pp. 923, 924.

† I have spoken of these forms in the usual way as if they are simply males and females distinguished by constant differences. It is quite possible, however, that their relation is more complex, and that, *e.g.*, the distinctive characters of the males are attained only during the breeding season, and that at other times the secondary sexual characters are poorly developed. In this case we would have something approximating to the "high and low dimorphism" so common in the Lamellicorn beetles and to the case described by Geoffrey Smith in the crab *Inachus mauritanicus;* he considers the condition of the "middle-sized males" in this species as one of partial hermaphroditism, and draws attention to the partial hermaphroditism described by C. L. Boulenger in *Orchestia*. In these, however, the small ova appear to be developed only in young males in which the secondary sexual characters are not well developed, the gnathopods being scarcely differentiated. (See Geoffrey Smith, "Cambridge Natural History," Crustacea, pp. 102–4, and C. L. Boulenger, P.Z.S., 1908, pp. 42–47.)

junction of which with the propod is marked by an imperfect row of setae; propod also enlarged on the posterior margin; finger not reaching to the end of the rounded lobe. Second gnathopod (fig. 7*d*) very large and strong, basos not widened; basos and ischium both slightly hollowed anteriorly to receive the propod when reflexed; carpus very small, almost covered by propod, propod with greatest width nearly equal to the length, anterior margin very convex, posterior also convex and distinctly marked off from the palm (though without defining spine), which forms a right angle with it; palm slightly oblique, produced near base of finger into a strong prominent subacute tooth which overlaps the finger on its outer side, portion between the tooth and end of palm deeply concave; this portion of palm is broad, the propod being here produced on the inner side into a prominent ledge; finger strongly curved, its inner margin bearing towards the base a small subacute projection which impinges

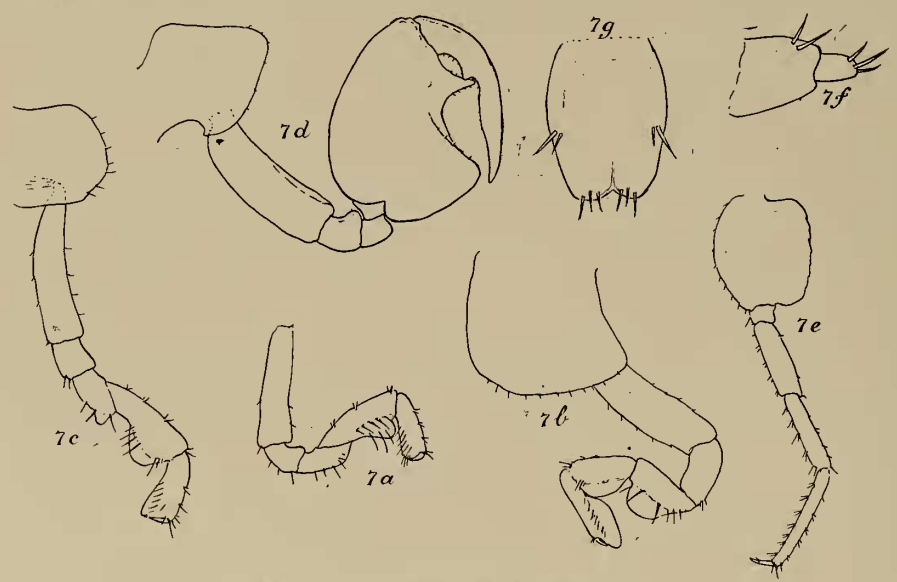

Fig. 7.—*Parorchestia maynei*, sp. nov.

7*a*. First gnathopod of female.
7*b*. Second gnathopod of female.
7*c*. First gnathopod of male.
7*d*. Second gnathopod of male.
7*f*. Third uropod of male.
7*g*. Telson of male.
7*e*. Fifth peraeopod of male.

against the tooth of the palm; the inner margin of the finger and the margin of the palm bearing a few short setae. Third peraeopod shorter than the fourth, both with the basos rather narrow; fifth (fig. 7*e*) a little longer than the fourth, its basos well expanded, posterior margin slightly convex and minutely serrulate, propod longer than either the merus or carpus, which are subequal, all the joints supplied with long setae, none of the joints specially expanded, finger long and slender. Uropods 1 and 2 with spines on peduncle and at the end of branches and on upper margin of inner branch, third uropod (fig. 7*f*) very small, not reaching beyond the telson, two strong setae on upper margin of peduncle, the branch half as long as peduncle, and bearing three setae at its extremity; telson (fig. 7*g*) with upper surface slightly concave, about two-thirds as broad as long, apex slightly emarginate, with three spines on each lobe, and two large spines near the middle of each lateral margin of telson.

Female.—Differing from the male in the gnathopoda; the first gnathopod (fig. 7*a*) similar to that of the male, but with no dilatation on the merus, a small one only on the carpus, and slight indication of one on the propod; second gnathopod (fig. 7*b*) with basos not broadened, the merus having the posterior margin widely dilated and the carpus dilated in the same way, the whole of the propod expanded, the expansion being marked off from the rest of the limb by a row of small setae, the palm directed slightly outwards and the short finger not reaching the rounded end of the propod.

Hab.—Several specimens, both male and female, from Norman Inlet, Auckland Island (J. B. Mayne), and one male and two females from Disappointment Island (Professor W. B. Benham). To this species I refer also some female specimens collected on Adams Island at a height of 2,000 ft. by Mr. R. Speight, and also others collected by myself on Auckland Island.

Type in the Canterbury Museum, New Zealand.

The female of this species is practically indistinguishable from that of *P. sylvicola*, so common on the main islands of New Zealand; but the male is easily recognised by the characteristic shape of the second gnathopod, though this is not easy to describe nor to represent clearly in a figure.

I have named the species after Mr. J. B. Mayne, who gathered many Crustacea for me during the expedition.

Parorchestia insularis, sp. nov.

Male.—Similar to *P. maynei* in most points; the pleon segments, however, appear to have the lower margins rather more rounded, and the posterior angle of the third segment is a little rounded and produced. The second gnathopod (figs. 8*b* and 8*c*) large, with the anterior surface of the basos slightly concave and grooved, that of the ischium deeply concave, each of its two margins being produced into a rounded lobe and fitting up against the propod when this is bent back upon these joints; the propod large, slightly dilated distally, its greatest width about four-fifths of its length, the palm slightly transverse, well defined but without defining-spine, with a broad but prominent tooth about one-third of the length of the palm from the base of the finger overlapping the finger on its outer side, remainder of the palm from the tooth to the defining-angle concave, palm narrow and not produced inwards as in *P. maynei;* finger moderately curved, without projection on its inner margin, its tip fitting into a slight recess between the defining-corner of the palm and a slight prominence on the inner side of this.

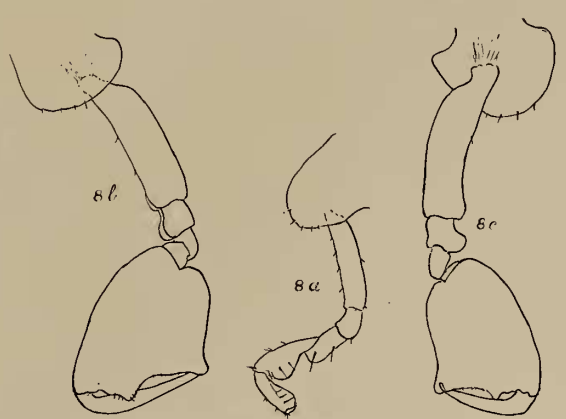

Fig. 8.—*Parorchestia insularis*, sp. nov.
8*a*. First gnathopod of male.
8*b*. Second gnathopod of male (outer side).
8*c*. Second gnathopod of male (inner side).

Length, 13 mm.

Female.—Practically indistinguishable from that of *P. maynei*.

Hab.—Campbell Island (Mr. G. R. Marriner and Messrs. Des Barres and Chambers). Type in the Canterbury Museum, New Zealand.

Specimens of a terrestrial hopper (belonging doubtless to this species) were reported by various members of the expedition to be extremely abundant on Campbell Island right up to the top of the highest hills; owing, however, to its very active habits, and to unfavourable opportunities for collecting, only a comparatively small number of specimens were actually secured.

This species evidently closely resembles *P. maynei*, but the second gnathopod of the male (though of the same type) differs, particularly in not having the palm broad and widely produced on the inner side of the propod.

Parorchestia parva, sp. nov.

Male.—Body small and compact, side plates not deep, pleon segments with lower margins rounded, posterior angle of third slightly rounded and produced.

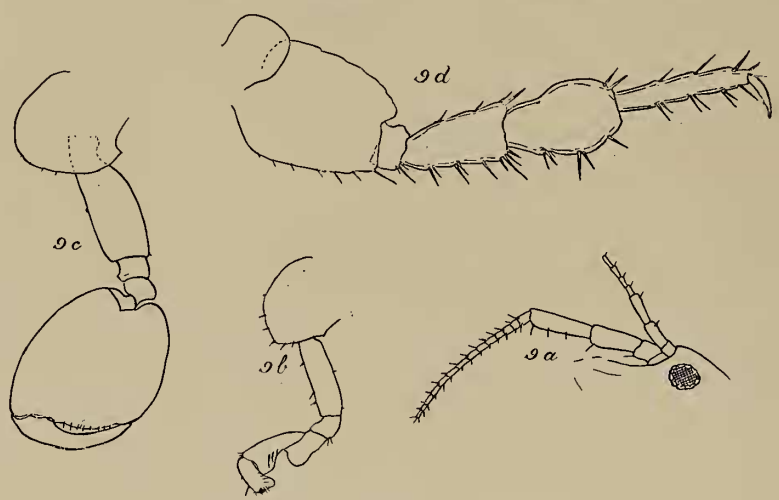

Fig. 9.—*Parorchestia parva*, sp. nov.

9*a*. Antennae of male.
9*b*. First gnathopod of male.
9*c*. Second gnathopod of male.
9*d*. Fifth peraeopod of male.

First antenna reaching about half-way along the last joint of peduncle of lower antenna, third joint of its peduncle longer than the second, flagellum of four joints, slightly longer than last joint of peduncle. Second antenna short, only one-third the length of the body, last joint of peduncle not much longer than the preceding one, flagellum longer than peduncle and containing about fifteen joints. First gnathopod of usual shape, second gnathopod with basos somewhat broadened, ischium and merus short and subequal; propod large, broadly oval, widest about the middle, where it is almost as wide as long; palm transverse or slightly oblique, badly defined, curving gradually into the posterior margin of the propod; margin of palm straight or slightly convex, and fringed with small setae; finger moderately curved, its tip fitting into a little recess on the inner side of the end of the palm, inner margin of finger without enlargement. Third peraeopod considerably shorter than the fourth, fifth somewhat longer than fourth, its basos only moderately dilated, the posterior margin being slightly convex and obscurely serrate, lower angle rounded

and only slightly produced ; merus broad, especially towards distal end, so that the whole joint is triangular ; carpus wide and irregularly dilated, greatest width about two-thirds its length ; propod slightly longer than carpus, not dilated ; all the joints supplied with rather long setae, except on the posterior margin of the merus, which has only two at the distal end. In other respects closely resembling *P. maynei.*

Female.—Resembling that of the two preceding species, except that the second antennae are shorter, being, as in the male, only about one-third the length of the body.

Hab.—Several specimens from Norman's Inlet taken in company with *P. maynei* (J. B. Mayne) ; others under logs on Auckland Island (Professor W. B. Benham).

Type in the Canterbury Museum, New Zealand.

This species is readily recognised by the short antennae, the large rounded propod of the second gnathopod with its simple palm, and by the dilatation of the merus and the carpus of the fifth peraeopod ; the peraeopods, too, are not so elongated as in the preceding species.

Parorchestia improvisa, sp. nov.

Male.—Unknown.

Female.—In general shape resembling *P. sylvicola.* Body not much compressed ; first three segments of pleon with lower margin slightly convex, posterior angle of third segment right-angled, with corner a little rounded. Eyes rather large, as far apart as their width. First antenna reaching middle of fifth joint of peduncle of second antenna, third joint of peduncle longer than second, flagellum about seven-jointed. Second antenna long, slender, about three-fourths the length of the body, fifth joint of peduncle nearly twice as long as the fourth, flagellum longer than peduncle, about 35-jointed. First gnathopod (figs. 10*a*, 10*b*) with the propod moderately large, widened, width about half the length, with the palm oblique, occupying nearly one-half the length of the whole posterior margin, the palm being defined by one or two stout setae situated on a little projection which is separated from the rest of the palm by a depression, another stout seta arising on the inner surface near the middle of this depression, the rest of the palm nearly straight or only slightly convex and bordered with a row of short setae, three other longer ones being situated on the surface near the palm and an oblique row of about six or seven further back on the outer surface of the propod ; the posterior margin of the propod also bears an irregular

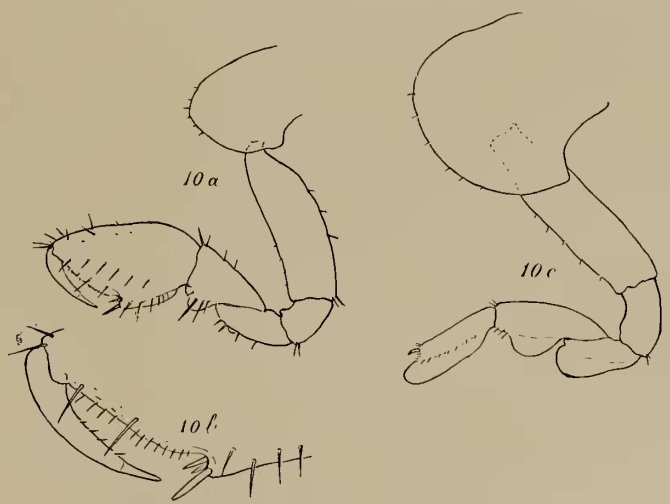

Fig. 10.—*Parorchestia improvisa*, sp. nov.

10*a*. First gnathopod of female.
10*b*. Palm of same, more highly magnified.
10*c*. Second gnathopod of female.

row of about six setae and is very slightly produced, forming a narrow pellucid area ; the carpus is triangular, of the usual shape, and is produced posteriorly into a somewhat irregular pellucid lobe, on the inner side of which arise three long setae ; there is also a very slight indication of a pellucid lobe on the posterior margin of the merus. Second gnathopod (fig. 10*c*) of usual shape, the finger very short, the lobe of the propod being produced far beyond its extremity. The third peraeopod is shorter than the fourth, and in each the basos is rather narrow oval. The fifth peraeopod is slightly longer than the fourth, and both are considerably elongated, in large specimens being about three-fourths the length of the body. The uropoda and telson of the usual form.

Length, 16 mm.

Hab.—Snares, five female specimens (G. R. Marriner). Also found in Stewart Island.

Type in the Canterbury Museum, New Zealand.

This species seems very peculiar in possessing a fairly large and well-developed subchelate first gnathopod in the female very different from the usual form of this appendage, and more nearly resembling what is generally found in the second gnathopod of the male. I have only about five or six specimens, but from these it appears that this form of gnathopod is only well developed when the female is mature, as the smaller specimens have the propod of the first gnathopod much more slender and more of the usual type, and in the smallest specimens the propod is of approximately the same width throughout, not being dilated at all, and the palm is transverse or only very slightly oblique.

I have long had from the north of Auckland a single imperfect female specimen of a *Parorchestia* which resembles the species now described in having the propod of the first gnathopod dilated and distinctly subchelate ; it differs, however, in having the propod suboblong, with a transverse palm. I had hitherto looked upon it as an abnormal specimen of *P. sylvicola*, but the existence of a somewhat similar form on the Snares shows that it may perhaps belong to a distinct species.

Since the above description was drawn up Mr. G. M. Thomson has handed over to me all the notes and drawings of *Amphipoda* that he has accumulated during many years past, and among them I find drawings made years ago of the gnathopoda of an undetermined species of land-hopper from Port Pegasus, Stewart Island, which correspond closely with a somewhat immature female of *Parorchestia improvisa*, and evidently belong to that species, so that this species occurs on the mainland of New Zealand as well as at the Snares.

Parorchestia tenuis (Dana).

> *Orchestia tenuis*, Dana, P. Amer. Ac., ii, p. 202, 1852, and U.S. Expl. Exped., xiii, ii, p. 872, pl. lix, fig. 1, 1853 and 1855. *Parorchestia tenuis*, Stebbing, " Das Tierreich Amphipoda," p. 557, 1906 ; Chilton, Trans. N.Z. Inst., xli, p. 58, 1909.

I have a few small specimens, obtained on the sea-shore of Perseverance Harbour, Campbell Island, at the mouth of a small fresh-water stream, that I think belong to this species, as defined by Stebbing ; they are the same as specimens from brackish and fresh-water streams in various parts of New Zealand. Although this species agrees with Stebbing's description of the genus *Parorchestia* in having a small

fourth joint on the palp of the maxillipedes, it does not appear to me to harmonize in all respects with the terrestrial species of *Parorchestia* known to me. The setae on the antennae and peraeopods are shorter and less prominent, the peraeopods themselves are stouter and less elongated, and the finger is shorter and thicker and the pleopoda longer than in the truly terrestrial species.

Genus **Hyale**, H. Rathke, 1837.

Distribution.—On all shores.

Hyale hirtipalma, Dana.

Allorchestes hirtipalma, Dana, P. Amer. Ac., ii, p. 205, 1852, and U.S. Expl. Exp., xiii, ii, p. 888, pl. lx, fig. 4, 1853 and 1855. *Nicea fimbriata*, Thomson, Trans. N.Z. Inst., xi, p. 236, pl. x*b*, fig. 2, 1879. *Hyale fimbriata*, Thomson, Trans. N.Z. Inst., xxvii, p. 211, 1895. *H. hirtipalma*, Stebbing, "Das Tierreich Amphipoda," p. 564, 1906. *H. trigonochir*, Walker, Ann. & Mag. Nat. Hist., ser. 8, ii, p. 37, 1908. *H. villosa*, Smith, Bull. U.S. Nat. Mus., No. 3, p. 58, 1876; Stebbing, "Das Tierreich Amphipoda," p. 574, 1906. *Allorchestes georgianus*, Pfeffer, Jahrb. Hamburg, Anst., v, p. 77, pl. i, fig. 1 *a–n*, 1888. *Hyale georgiana*, Stebbing, "Das Tierreich Amphipoda," p. 572, 1906.

I have specimens of this species from Enderby Island, and others from Perseverance Harbour, Campbell Island, and also from the Antipodes Islands (collected by Dr. L. Cockayne in 1903), and from Macquarie Island (A. Hamilton).

The specimens from Enderby Island agree precisely with Mr. Walker's *Hyale trigonochir*, but this species is, I think, undoubtedly the same as *H. hirtipalma* (Dana). Mr. Walker says that the form of gnathopod 1 in the male is the most salient character of his species. In large full-grown males the propod of this gnathopod is certainly more triangular than in the female or in immature males. I find, however, on comparison of different specimens that there is very considerable variation in the shape of this joint: for example, some males from the Antipodes Islands show the propod quite triangular, as in Mr. Walker's figure, while in others it is more oblong, though these already possess the tufts of fine hairs characteristic of the male, and apparently only attained to the full extent in mature males.

The species is found throughout New Zealand and the adjacent islands, in South America (Valparaiso, Island of San Lorenzo, Peru).

I think there can be no doubt that *Hyale villosa*, S. I. Smith, from Keguelen, and *Allorchestes georgianus*, Pfeffer, from South Georgia, also belong to the species, and that it is therefore widely distributed in subantarctic seas.

Hyale novae-zealandiae (G. M. Thomson).

Nicea novae-zealandiae, G. M. Thomson, Trans. N.Z. Inst., xi, p. 235, pl. x B, figs. 1 *a–f*, 1878. *Hyale novae-zealandiae*, G. M. Thomson, *l.c.*, xxvii, p. 211, 1895; Stebbing, "Das Tierreich Amphipoda," p. 567, 1906.

Specimens obtained from Macquarie Island by Mr. A. Hamilton are referred by Mr. Thomson to this New Zealand species. I have several specimens from the Snares that appear also to belong to this species, which, according to Stebbing, is very near to *H. grandicornis*, Kröyer, from South America (Valparaiso).

Hyale campbellica (Filhol).

Allorchestes campbellica, Filhol, "Mission de l'Île Campbell," p. 466, 1885.
Hyale campbellica, Stebbing, "Das Tierreich Amphipoda," p. 562, 1906.

Described by Filhol from specimens collected on the shores of Perseverance Harbour, but his description is insufficient for identification.

Genus **Chiltonia**, Stebbing, 1899.

Distribution.—New Zealand and adjacent islands, Australia, and Tasmania. *Hyalella*, a closely allied genus, is common in South America.

Chiltonia mihiwaka (Chilton).

Hyalella mihiwaka, Chilton, Ann. & Mag. Nat. Hist., ser. 7, i, p. 423, pl. xviii, 1898. *Chiltonia mihiwaka*, Stebbing, "Das Tierreich Amphipoda," p. 555, 1906; Chilton, Trans. N.Z. Inst., xli, p. 57, 1909.

A few specimens of this species, both male and female, were collected by Professor Benham in a fresh-water pool not far from the sea on Enderby Island, and

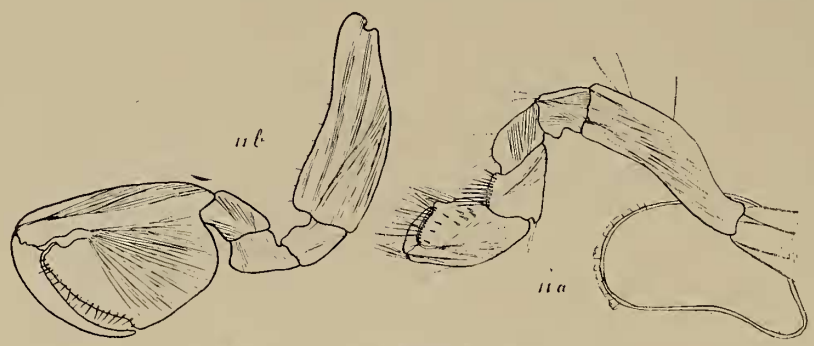

Fig. 11.—*Chiltonia mihiwaka* (Chilton).

11*a*. First gnathopod of male of Auckland Island specimen.
11*b*. Second gnathopod of male of Auckland Island specimen.

others were taken at the exit of a fresh-water pool on Auckland Island; two small female specimens were found by Mr. Laing in a fresh-water stream on Campbell Island.

These specimens all evidently belong to the one species, and are almost identical with specimens from the South Island of New Zealand, differing only in having the palm of both gnathopods (figs. 11*a*, 11*b*) slightly more oblique than in the New Zealand specimens.

Two species of *Chiltonia* have been described from fresh-water streams in Victoria by Mr. O. A. Sayce; one of these, *C. subtenuis*, is apparently closely related to *C. mihiwaka*, but differs in having shorter antennae and a more slender body.

More recently Mr. Geoffrey Smith has found species of *Chiltonia* abundant in the fresh-water streams and lakes of Tasmania.*

* "Naturalist in Tasmania," Oxford, 1909, p. 136; and Proc. Roy. Soc. (B), lxxx, p. 472, 1908.

Genus **Allorchestes**, Dana, 1849.

Distribution.—Widely distributed.

Allorchestes novae-zealandiae, Dana.

Allorchestes novi-zealandiae (♀), *A. intrepida* (♂), Dana, P. Amer. Ac., ii, p. 207, 1852, and U.S. Expl. Exped., xiii, ii, p. 894, pl. lxi, figs. *a–v*, 1853 and 1855; Thomson, Trans. N.Z. Inst., xxi, p. 260, pl. xiii, fig. 3, 1889; Stebbing, "Das Tierreich Amphipoda," p. 581, 1906; Walker, Ann. & Mag. Nat. Hist., ser. 8, ii, p. 39, 1908.

Of this species I have several specimens, both male and female, from Ewing Island, collected by Dr. L. Cockayne in July, 1903. It was also taken at Enderby Island by Mr. Hodgson during the voyage of the "Discovery." The specimens agree well with the description as given by Stebbing in "Das Tierreich Amphipoda."

The species is widely distributed about the coast of New Zealand, and probably extends also to South America.

Fam. AORIDAE.

Genus **Aora**, Kröyer, 1845.

Distribution.—Contains only the following species, which is widely distributed in the Atlantic, Pacific, and Southern Oceans.

Aora typica, Kröyer.

Aora typica, Kröyer, Naturh. Tidsskr., ser. 2, i, p. 328, pl. iii, figs. 3 *a–l*, 1845; Chilton, Ann. & Mag. Nat. Hist., ser. 5, xvi, p. 370, 1885; Stebbing, "Das Tierreich Amphipoda," p. 587, 1906.

Further synonymy will be found under the reference last quoted.

A single male specimen from Musgrave Harbour, Auckland Island, taken in seine net (E. R. Waite); also a female specimen collected by Professor Benham. The male specimen belongs to the form which I have described under the name "*Aora typica* ♂, form 1" (*l.c.*, p. 370).

Under the name *Aora typica* Mr. Stebbing has united various forms previously known by distinct names, so that the species as now understood by him has a wide range, being known from the North Atlantic with adjoining seas (Europe), Pacific (South America, Australia, New Zealand), Southern Indian Ocean (Kerguelen Island). It includes at least three different forms of the male, differing in the character of the first gnathopod. Of this, Mr. Stebbing says, "The second joint in adult male (*typica*) is said to have a triangular process on the front margin," a statement somewhat unduly cautious, seeing that the triangular process in question was described and figured by Nicolet, mentioned by Spence Bate and by G. M. Thomson, and that as far back as 1885 I described and figured it, and also suggested a possible function for it.

This particular form of the male is known from the coasts of Chili as well as from New Zealand, but I do not know of any record of its being found elsewhere. In New Zealand it is associated with a second male form, which appears to be the same as the form described as *A. gracilis* by Bate from British seas; while in Australia there is a third form, differing in several small details. For these several male forms

only one form of the female is known, and it is, I presume, mainly for this reason Mr. Stebbing has united them all into one species. In this I am inclined to agree with him; but, if we are to be logical, the same method will have to be adopted in several other cases among the *Amphipoda*.

Genus **Lembos**, Bate, 1856.

Distribution.—In all seas.

Lembos kergueleni (Stebbing).

Antonoe kergueleni, Stebbing, Rep. "Challenger," xxix, p. 1087, pl. cxi, 1888; G. M. Thomson, Ann. & Mag. Nat. Hist., ser. 7, x, p. 464, 1902. *Lembos kergueleni*, Stebbing, "Das Tierreich Amphipoda," p. 598, 1906; Walker, Trans. Linn. Soc., xii, p. 337, pl. xliii, fig. 6, 1909.

A specimen that appears undoubtedly to belong to this species was taken at the Snares. Owing to an accident in mounting it, the specimen is in poor condition, but the shape of the first gnathopod of the male so closely resembles the figure and description given by Stebbing that I think there can be little doubt that it belongs here. The rest of the animal, so far as can be made out, is also in general agreement with his description, but the basos of the second gnathopod does not seem to be specially dilated.

The species was first taken at Kerguelen Island, and has since been recorded by Mr. G. M. Thomson from the Bay of Islands, New Zealand. Quite recently Mr. Walker has recorded it from two localities in the Indian Ocean.

I have also another specimen, dredged in about 8 fathoms in Perseverance Harbour, Campbell Island, that evidently belongs to this genus, and is, I think, only a more fully developed male of this species, though the shape of the first gnathopod (fig. 12*a*) is considerably different. The carpus is much shortened and the propod very large, longer than the rest of the limb, and much swollen, forming a broad oval, with the palm oblique; the palm is defined by a stout tooth, and from the centre of the palm there arises a much longer tooth with broadened base, the finger fitting into a groove or depression on the inner side of these two teeth; a few long setae are found scattered on the palm, and a tuft at the end of the anterior margin near the base of the finger and three smaller setae are situated on the inner margin of the finger, but the rest of the gnathopod is almost completely free of setae. The second gnathopod (fig. 12*b*) also presents certain differences; the basos is slightly curved, broadly oblong, and has the

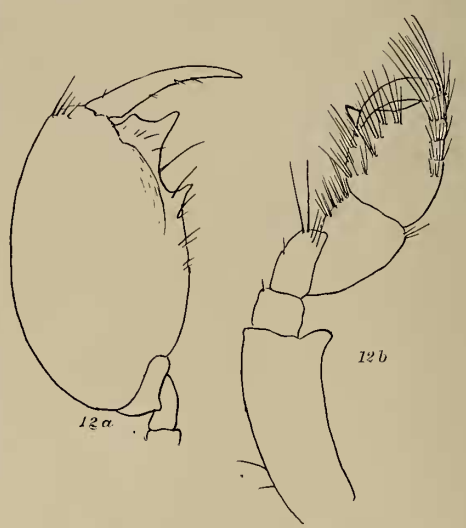

Fig. 12.—*Lembos kergueleni* (Stebbing).
12*a*. First gnathopod of fully developed male.
12*b*. Second gnathopod of fully developed male.

distal angle of the anterior margin subacutely produced; the carpus is nearly as long as the propod and about the same width, and bears on its posterior margin four transverse rows of setae; the propod is suboblong, the width about three-fourths the length, the palm slightly oblique, defined by a prominent tooth, near the base of which is a slight rounded prominence on the palm, the finger fitting into the depression between the two, while the rest of the palm is slightly concave; numerous transverse rows of setae are found along both margins and also on the side of the propod.

The differences in appearance of the gnathopods in this specimen from Stebbing's figure are so great that one would hardly think of suggesting that it belongs to the same species but for a knowledge of the great changes that may take place in appendages like this, which are specially modified in males; and I think it is very probable that Mr. Stebbing's description was taken from an immature male, while the specimen described above represents a more mature male of the same species.

Since this was written I have received Mr. Walker's paper quoted above, in which he also points out that the "Challenger" specimen was probably immature, and that an adult male from Kerguelen might appear very different from the specimens examined by him. The additional description that he gives agrees, on the whole, with my Snares specimen, and also with the Campbell Island specimen, except as regards the gnathopoda, and thus tends to confirm my opinion that the latter is an adult male of *Lembos kergueleni*, Stebbing. This opinion has since been fully confirmed by an examination of the New Zealand specimens which Mr. Thomson has kindly placed at my disposal, for among them I find forms quite intermediate between that described by Mr. Stebbing and the form with very large propod and oblique palm in the second gnathopod described above.

After this was in type I found another specimen of this species in Mr. G. M. Thomson's collection, in a tube containing specimens of *Hyale novae-zealandiae* from Macquarie Island (collected by Mr. A. Hamilton), thus still further extending its range in antarctic seas.

Fam. Jassidae.

Genus Jassa, Leach, 1813–14.

Distribution.—In all seas.

Jassa pulchella, Leach.

Jassa pulchella, Leach, Edinb. Enc., vii, p. 433, 1813–14; Stebbing, "Das Tierreich Amphipoda," pp. 654, 739, 1906. *Bruzeliella falcata*, Norman, Ann. & Mag. Nat. Hist., ser. 7, xvi, pp. 83, 92, 1905; Walker, Trans. Linn. Soc., Zool., xii, p. 343, 1909.

Full synonymy will be found in Stebbing's "Das Tierreich Amphipoda."

A specimen of this cosmopolitan species was taken on the carapace of *Halicarcinus planatus*, at Auckland Island. Mr. Thomson and I have frequently taken this species adhering to the body of *Jasus edwardsii*, and its wide distribution is probably to be partly accounted for by its habit of attaching itself temporarily to this and others of the larger *Crustacea*.

Suborder CAPRELLIDEA.

Fam. CAPRELLIDAE.

Genus **Caprellinopsis**, Stebbing, 1888.

Distribution.—New Zealand and South America (Chili).

Caprellinopsis longicollis (Nicolet).

Caprella longicollis, Nicolet, Gay's Historia di Chile, Crustacea, p. 251, pl. iv, fig. 5, 1849. *Caprellina novae-zealandiae*, Thomson, Trans. N.Z. Inst., xi, p. 247, pl. x D, fig. 6, 1879. *Caprellina longicollis*, Mayer, "Caprelliden des Golfes von Neapel," p. 27, 1882; Caprellidae Siboga Expedition, p. 30, 1903. *Caprellinopsis longicollis*, Stebbing, Rep. "Challenger," xxix, p. 233, 1888.

Two female specimens from the Snares. This species is known also from all the coasts of New Zealand, from South America (Chili), and from South Africa.

Order ISOPODA.

Suborder ASELLOTA.

Fam. PARASELLIDAE.

Genus **Janira**, Leach, 1814.

Distribution.—Widely distributed in northern seas; known, as yet, only from New Zealand and Auckland Islands in the south.

Janira neglecta, sp. nov.

Specific Diagnosis.—Body oblong-oval, somewhat narrow, rather less than three times as long as broad; cephalon with sides nearly straight, posterior angles rounded, front very slightly convex between the bases of the antennules. Lateral margins of all the segments of the peraeon straight or slightly convex, entire, quite covering the coxal plates. Pleon oval, narrowing posteriorly, about as wide anteriorly as it is long; margins smooth, entire, posterior margin very slightly produced between the bases of the uropoda. Eyes large, of numerous ocelli. Antennules reaching to the end of the penultimate joint of peduncle of the antennae; first peduncular joint broad, nearly circular; second nearly as long, but much narrower; third shorter, hardly distinguishable from the flagellum, which contains about ten joints.

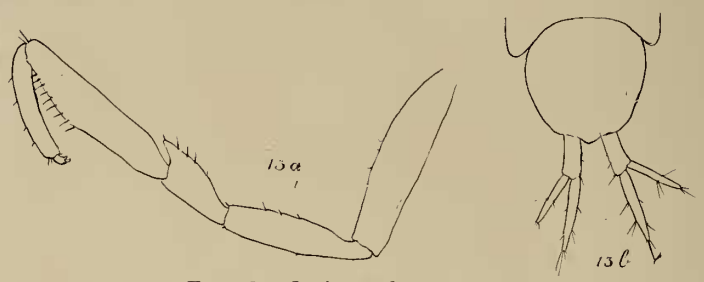

FIG. 13.—*Janira neglecta*, sp. nov.
13*a*. Leg of first pair of male.
13*b*. Pleon and uropoda.

Antennae about as long as body; last two joints of peduncle subequal, with smooth margins with a few fine setae; the scale on the third joint narrow but distinct; flagellum much longer than peduncle. First pair of legs (fig. 13*a*) with the basos slightly longer than the ischium and as long as the carpus, merus only half as

long as the ischium, carpus slightly expanded in its distal half, the inner margin of this portion bearing about ten setae; the dactylar claws of all the legs subequal. Uropoda (fig. 13*b*) equal in length to the pleon; base slightly expanded distally, as long as the outer ramus, which is about two-thirds the length of the inner; both rami rather slender, and provided with small tufts of long slender setae.

Colour, yellow, dorsal surface densely mottled with dark markings.

Length, 3 mm.

Hab.—Carnley Harbour, Auckland Islands, 2 fathoms (Professor W. B. Benham); also known from Port Chalmers, and from Lyall Bay, Wellington, New Zealand. The Carnley Harbour specimen is a male, but probably immature; it has the first pair of legs less well developed than is shown in fig. 13*a*, which is taken from a Port Chalmers specimen. I have had specimens of this species from both Port Chalmers and Lyall Bay for many years, but it has hitherto remained undescribed; in general appearance and in the appendages it appears to approach pretty closely to *Janira maculosa*, Leach, the species common in the northern seas, but it differs in having the margins of the peraeon and pleon entire, and apparently the body is somewhat narrower than in that species.

Genus **Iais**, Bovallius, 1886.

Distribution.—Subantarctic seas.

Iais pubescens (Dana).

Jaera pubescens, Dana, U.S. Expl. Exped., xiii, p. 744, pl. xlix, fig. 9, 1853; S. I. Smith, Bull. U.S. Nat. Mus., No. 3, p. 63, 1876. *Iais pubescens*, Stebbing, P.Z.S., 1900, p. 549, 1900; "Spolia Zeylanica," ii, pt. v, p. 11, 1904.

Full reference to the literature dealing with this much-described species up to the year 1900 will be found in Mr. Stebbing's first paper quoted above.

Numerous specimens were taken both at Auckland Islands and at Campbell Island on *Exosphaeroma gigas* (Leach), and many were collected at Campbell Island creeping freely on the under-surface of stones in places where the *Exosphaeroma* was abundant. These specimens agree closely with others taken under similar circumstances at various parts of New Zealand. I have been able to compare them with specimens from Falkland Islands, and I find that they agree as closely with these also, as might naturally have been expected from the description given of these Falkland Island specimens by Mr. Stebbing.

This little species, like its host, *Exosphaeroma gigas*, is therefore widely distributed round the globe in subantarctic seas, while Mr. Stebbing also records it from Lake Negombo, in Ceylon, where it appears to have been associated with *Sphaeroma terebrans* (Bate). Its connection with the host has generally been spoken of as parasitic or semi-parasitic, though it perhaps would be more correctly described by the word "commensal." Mr. Stebbing says of it, "Apparently the small isopod makes use of the large one as a kind of floating island, affixing its eggs to it, and in adult life still clinging on but doing no harm to its animated lodging." * In stating that the *Iais* attaches its eggs to the *Exosphaeroma*, Mr. Stebbing temporarily over-

* P.Z.S., 1900, p. 550.

looked the fact that, like most other Isopods, *Iais* hatches out its eggs in an incubatory pouch under its own body. It is evident that he knew that this was actually the case in *Iais pubescens* from his reference to the marsupium upon the same page. The eggs are few in number (usually not more than five or six) and of comparatively large size, in both respects, therefore, differing from the conditions of things usually found in true parasites. The *Iais* can evidently leave the *Exosphaeroma* if it wishes to, as is shown by the fact that I have frequently taken it away from the *Exosphaeroma*. It would be interesting to know whether this separation is merely temporary for the purpose of seeking food, and if the *Iais* returns to the *Exosphaeroma* for shelter when danger threatens.

During a recent visit to the Sounds on the west coast of New Zealand I found *Iais pubescens* in great abundance in nearly all of them. I seldom failed to find it at the head of each Sound, creeping freely on the surface of stones at the mouths of the fresh-water streams; at low tide these stones would be washed with fresh water only, and some were above the reach of ordinary high tides. At high tide the animals would in most cases be covered with sea-water, but this at the head of the Sounds is often more or less brackish. In most of these localities I did not see any Sphaeromid from which the animal could have escaped. The Campbell Island specimens were also mainly collected near the mouth of a small stream, but in a place that would be completely covered with salt water at high tide.

Mr. Stebbing's Ceylon specimens were obtained from Lake Negombo, which Dr. Arthur Willey describes as "a salt-water lake having both fluviatile and marine connections."

It thus appears that *Iais pubescens* is a species that can live either free or in association with a Sphaeromid, and either in fresh water or in salt, and to this adaptability to varying conditions it doubtless owes its wide distribution and abundance.

Genus **Haliacris**, Pfeffer, 1886.

Distribution.—Antarctic and subantarctic seas.

I provisionally adopt this genus for the following species merely to draw attention to its close relationship to *H. antarctica*, Pfeffer. The genus has been accepted by Miss Richardson, and provisionally by Mr. Hodgson, but in his report on the "Discovery" *Isopoda* he says, "It is much open to question if it is distinct from *Munna*. I think not."* And with this opinion I quite agree.

Haliacris neozelanica (Chilton).

Munna neozelanica, Chilton, Ann. & Mag. Nat. Hist., ser. 6, ix, p. 1, pl. i, ii.

Auckland and Campbell Islands; also New Zealand.

Several specimens—some males with the first pair of legs fully developed, others females with eggs in the brood-pouch—were taken by Professor Benham under stones on Masked Island, in Carnley Harbour, Auckland Islands. He had previously sent me one male specimen collected at Campbell Island in February, 1907. These specimens all agree closely with specimens from the type locality, Otago Harbour.

This species is close to *Haliacris antarctica*, Pfeffer, from South Georgia, with which *H. australis*, Hodgson, from Cape Adare, is now united by Hodgson. Judging

* Quoted from a proof of his report, which Mr. Hodgson has kindly sent to me.

from the figures and descriptions given by these two authors, the females of the two species are probably almost identical. Miss Harriet Richardson has recorded *H. australis* from Booth Wandel Island, and has described the male, which was previously unknown, as Hodgson's three specimens were all females.

In both species the male differs from the female in the great size and peculiar form of the first pair of legs, and from the figure given by Miss Richardson it is evident that these appendages in *H. neozelanica* (fig. 14*a*) differ from those of *H. antarctica*, being, as her figure (see fig. 14*b*) shows, of distinctly different shape. Pfeffer does, indeed, say that the males and females of his species resemble each other in the structure of the first pair of legs; but, as Miss Richardson says, it is probable that his specimens "*vier ganz schlechte Exemplare*" were all females, and that the mature male with the fully developed first pair of legs was really unknown to him.

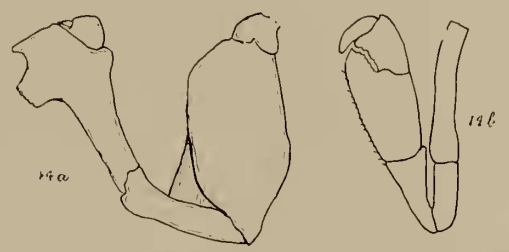

FIG. 14.—*Haliacris neozelanica.*

14*a*. *Haliacris neozelanica* (Chilton), first leg of male.
14*b*. *Haliacris antarctica*, Pfeffer, first leg of male [after Miss Richardson].

Suborder FLABELLIFERA.

Fam. CYMOTHOIDAE.

Genus **Cirolana**, Leach, 1818.

Distribution.—In all seas.

Cirolana rossii, Miers.

Cirolana rossii, Miers, Ann. & Mag. Nat. Hist., ser. 4, xvii, p. 228, 1876, and Cat. N.Z. Crust., p. 109, pl. iii, fig. 3, 1876; Hutton, Trans. N.Z. Inst., xi, p. 340, 1879.

A few small specimens were obtained in Perseverance Harbour, Campbell Island, dredged in 8 fathoms; others, from Auckland Island, are in Mr. G. M. Thomson's collection; and the species has also been recorded from Auckland Islands by Hutton. It is common on the New Zealand coasts, and is closely allied to, if not identical with, *C. hirtipes* M.-Edwards, from the Cape of Good Hope.

Genus **Livoneca**, Leach, 1818.

Distribution.—In all seas.

Livoneca novae-zealandiae, Miers.

Lironeca novae-zealandiae, Miers, Ann. & Mag. Nat. Hist., ser. 4, xvii, p. 227, and Cat. N.Z. Crust., p. 106, pl. iii, fig. 2, 1876; Filhol, "Mission de l'Île Campbell," p. 450, pl. lv, fig. i, 1885. *L. stewarti*, Filhol, "Mission de l'Île Campbell," p. 450, pl. lv, fig. 6, 1885. *Livoneca raynaudii*, Whitelegge, "'Thetis' Scientific Results," Australian Museum Memoir iv, pt. iii, p. 236, 1901.

One specimen, found on *Notothenia colbecki*, from Antipodes Island (E. R. Waite). This is a common species on the New Zealand coasts, where it is found parasitic on

various species of fish. *L. stewarti*, Filhol, is, I think, hardly sufficiently distinct to be maintained as a separate species. According to Mr. Whitelegge, *L. novae-zealandiae* was taken by the " Thetis " Expedition at several localities off the coast of Australia. I have also a small specimen from Norfolk Island that does not differ specifically from the New Zealand species. It has also been recorded by Miers from Portland Bay, Straits of Magellan.* Whitelegge unites this species with *L. raynaudii*, Milne-Edwards, from the Cape of Good Hope ; this may very probably be correct, but Milne-Edwards's original description is very short, and comparison of actual specimens is desirable before finally reducing *L. novae-zealandiae* to the rank of a synonym.

Fam. Serolidae.

Genus **Serolis**, Leach, 1825.

Distribution.—Widely distributed in subantarctic seas.

Serolis latifrons, Miers.

Serolis latifrons, Miers, Ann. & Mag. Nat. Hist., ser. 4, xvi, p. 74, 1875, and Cat. N.Z. Crust., p. 117, pl. iii, fig. 7, 1876 ; Rep. " Challenger " Isopoda, p. 44, pl. ii, figs. 1–4, 1884 ; S. I. Smith, Bull. U.S. Nat. Mus., No. 3, p. 63, 1876.

Recorded from " Rendezvous Cove, Auckland Islands," by E. J. Miers from specimens in the British Museum. This species is known also from Kerguelen and the Crozets.

Fam. Sphaeromidae.

Genus **Exosphaeroma**, Stebbing, 1900.

Exosphaeroma, Stebbing, P.Z.S., 1900, p. 553.

Distribution.—Widely distributed in southern seas.

Exosphaeroma gigas (Leach).

Sphaeroma gigas, Leach, Dict. Sc. Nat., xii, p. 346, 1818 ; Miers, Cat. N.Z. Crust., p. 110, 1876 ; Hutton, Trans. N.Z. Inst., xi, p. 340, 1879 ; Haswell, Cat. Aus. Crust., p. 287, 1882 ; G. M. Thomson, Proc. Roy. Soc. Tasmania, p. 14, 1893 ; S. I. Smith, Bull. U.S. Nat. Mus., No. 3, p. 63, 1876. *S. obtusa*, Hutton, Trans. N.Z. Inst., xi, p. 341, 1879. *Exosphaeroma gigas*, Stebbing, P.Z.S., 1900, p. 553, 1900, and " South African Crustacea," ii, p. 69, 1902 ; Hansen, Quart. Journ. Micr. Sci., xlix, p. 118, 1905.

The species is widely distributed in subantarctic seas.

Full references to the earlier papers dealing with this species will be found in the first of Mr. Stebbing's papers quoted above ; in it he considered *Sphaeroma lanceolatum*, White, as a synonym of *Sphaeroma gigas*, Leach, but in the paper on the " South African Crustacea " he says, " On the whole, it now seems to me that the two forms ought to be kept specifically separate, and that the names allotted by Leach and White may conveniently stand, although it may not be absolutely certain which of the forms Leach had before him."

* P.Z.S., 1881, p. 77.

Of this widely distributed and much-described species I have been able to examine numerous specimens from the Auckland Islands, Campbell Islands, and from the Macquaries, and to compare them with specimens from the main islands of New Zealand and from the Falkland Islands.

My specimens vary very much in size, the largest being as much as 25 mm. in length ;* most of them are of a slaty colour, but some are of a light brown, with markings as described by Stebbing for the Falkland Island specimens. I have compared them with Mr. Stebbing's description, and can find no real point of difference ; the straight ridge which he describes separating the vertex of the head from the occiput is well marked in the larger specimens, but indistinct or almost absent in the smaller ones, the front of the head being in them more produced and the angles of the first peraeon segment not produced quite so far anteriorly.

There is very considerable variation in the shape of the terminal segment of the pleon : in some cases it is somewhat narrowly rounded and in others much broader. I noticed this when collecting specimens from the one locality on the shore of Perseverance Harbour, Campbell Island, but I cannot associate the differences with that of sex. In the same way the amount of in-folding of the lateral margin of the terminal segment of the pleon on the ventral side also varies considerably.

Captain Hutton identified some specimens collected from Auckland and Campbell Islands with *Sphaeroma obtusa*, Dana. Through the kindness of Professor Benham I have been able to examine these specimens, but find they are only *Exosphaeroma gigas* in which the terminal segment is somewhat narrow. Similar specimens labelled "*S. obtusa*" were also in Mr. Thomson's collection, which has been placed at my disposal. I have never satisfactorily identified any specimens with Dana's *S. obtusa*.

Genus **Pseudosphaeroma** (novum).

This genus comes under the division *Sphaerominae eubranchiatae*, Hansen, though it differs from Hansen's description of that group in the characters of the posterior end of the pleon, and to some extent also in the pleopoda, and may be defined as follows :—

Exopod of third pleopod not articulated. Basal joint of first antennae not expanded, not much broader than the second. Uropoda with both branches equally developed in both sexes, and ovoid in shape. The male differing from the female in having small tubercles on the first portion of the pleon, and two well-marked tubercles near the anterior margin of the second portion. End of pleon without emargination, ending in a flat or upturned projection. Female without tubercles on the pleon and with terminal portion less produced. Mouth parts not modified in the female. Eggs developed in internal pouches in the general body cavity.

This genus, though by the character of the pleopods undoubtedly belonging to the *Sphaerominae eubranchiatae*, differs from it, and resembles certain species of *Sphaeroma*, *Exosphaeroma*, &c., in having the terminal segment quite without emargination, and the exopod of the fifth pleopoda mainly opercular and with only a

* Stebbing gives the length of his Falkland Island specimens as " about 18 mm.," while the specimens from Kerguelen examined by S. I. Smith were " of all sizes, from 5 mm. to 29 mm. in length."

few poorly developed transverse folds on the inner part near the base, so that at first I thought it was a species of *Exosphaeroma*, and began to describe it as such. Except for the sexual differences and the lack of emargination in the terminal segment, it seems to come pretty close to *Dynamenella*. Monsieur E. G. Racovitza* has recently described a genus *Ischyromene* which seems to be somewhat nearly related, and also shows sexual differences, but these are of a different character to those found in the genus now under discussion.

The type species is *P. campbellensis*, described below.

Pseudosphaeroma campbellensis, sp. nov.

Male.—Body fairly convex, widening a little posteriorly; head with the front depressed, vertex bounded in the front by a slight ridge and produced a little between the bases of the upper antennae, surface of head slightly uneven.

First three segments of peraeon subequal, a little longer than the fourth, which is longer than any of the following three segments, the surface of all nearly smooth, but with some slight granulations, specially towards the sides and on the last three segments.

First portion of the pleon with two sutures at the sides, and bearing near the centre two small rounded tubercles. The second division of the pleon with two well-marked tubercles in the centre near the anterior margin, each tubercle being bifid at its extremity; the segment is produced posteriorly, with the posterior border broadly truncate, with rounded angles and hinder portion usually sharply upturned, but in some cases nearly horizontal; whole surface of the pleon finely granular.

The eyes rather small, subtriangular, occupying the postero-lateral angles of the head. First antenna with the first joint large and broad, with indentation on posterior margin, second joint nearly as broad but much shorter, the third much longer than second but much narrower, flagellum consisting of about eight joints, which bear only a few setae. Second antenna longer than the first, last two joints of peduncle subequal and longer than the preceding one, flagellum containing about eleven joints.

First pair of legs shorter than the succeeding pairs, the carpus being shorter than the ischium and subtriangluar in outline, a few fine woolly setae on the inner surface of the merus, and larger setae on the ischium, carpus, and propod; the succeeding pairs of legs rather longer, increasing slightly in length posteriorly, with the carpus nearly as long as the merus, and the inner surface of the merus, carpus, and propod thickly fringed with short woolly setae; longer setae on the other joints, as shown in figure.

The uropods with the inner branch reaching almost or quite to the end of the terminal segment, outer branch slightly shorter, both oval, with the extremities rounded.

Female.—With the posterior segment of the pleon less produced and only slightly upturned, and without the tubercles on the dorsal surface. The immature males resemble the females in these points, but may have the tubercles on pleon partially developed.

* " Archives de Zoologie expérimentale et générale " [4], ix, notes et revue No. 3, p. lx, figs. 1 to 3, 1908.

Colour.—Greenish-brown, with the margins of the segments reddish.

Length of male, 7 mm.; breadth, 3 mm.

Hab.—Perseverance Harbour, Campbell Island (November, 1907). Numerous specimens taken on the shore, at the mouth of a small fresh-water stream, in company with *Exosphaeroma gigas;* Auckland Island (Dr. L. Cockayne, 1903).

Type in Canterbury Museum, New Zealand.

The Auckland Island specimens are apparently nearly all immature; in the largest male the two tubercles on the terminal portion of the pleon are present, but are not so well marked, and are not bifid at the extremity, and in all the specimens the terminal segment is less broadly truncate.

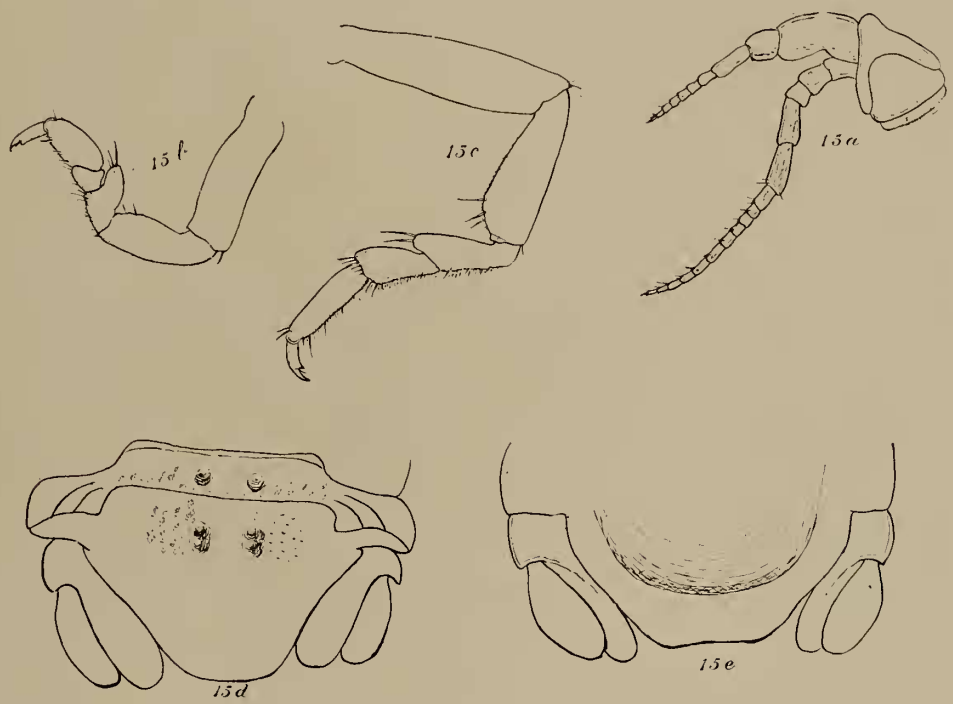

Fig. 15.—*Pseudosphaeroma campbellensis*, sp. nov.

15*a*. Antennae, with epistome and upper lip.
15*b*. First leg of male.
15*c*. Seventh leg of male.
15*d*. Pleon and uropoda of male (from above).
15*e*. Pleon and uropoda of male (from below).

The mouth parts are, on the whole, very similar to those of *Exosphaeroma gigas*. The epistome widens downwards, and the upper lip has the distal border straight. The mandible has the incisor process ending in one or two teeth, accessory plate stronger on the left than on the right mandible and ending in two or three teeth, the molar process strongly developed; the palp not reaching beyond the extremity of the incisor process, its first segment broad, second as long as the first but narrower, with a row of pectinate spines, third rather strongly curved, the concave border with a row of short spines, those towards the end being longer and pectinate. First maxilla with the inner plate narrowing towards the end, which bears four plumose setae; outer plate with about nine teeth at the extremity, the inner ones being smaller

and pectinate or dentate, the outer ones broad and smooth and brown in colour. Second maxilla with the two outer lobes subequal, each bearing at the end four strong pectinate setae ; inner lobe as long as the two outer, its extremity oblique and fringed with numerous short plumose setae ; a few short setae also on its inner margin. The maxillipedes with the basos a little widened at the base and with its outer margin fringed with fine setae, the end of its lobe bearing six or seven stout short setae and numerous fine hairs ; third joint short ; fourth, fifth, and sixth produced on the inner side into a rounded lobe fringed with setae ; the seventh bearing on its apex five long plumose setae and some shorter ones.

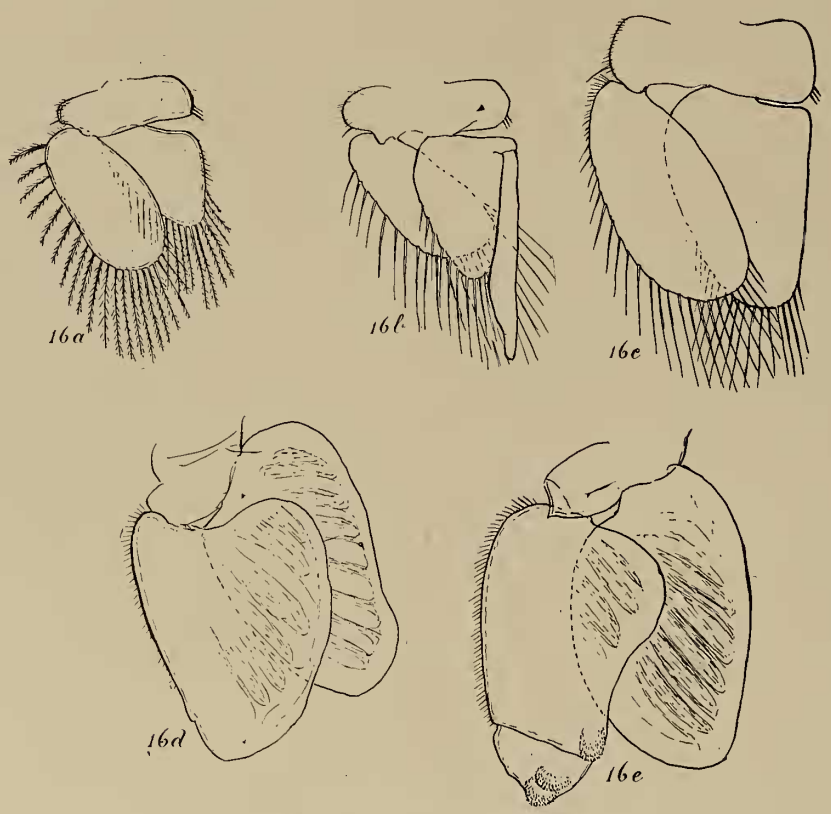

Fig. 16.—*Pseudosphaeroma campbellensis*, sp. nov.

16*a*. First pleopod of male.
16*b*. Second pleopod of male. (Plumes on setae omitted.)
16*c*. Third pleopod of male. (Plumes on setae omitted.)
16*d*. Fourth pleopod of male.
16*e*. Fifth pleopod of male.

In a female in which the interior of the body was completely filled with eleven young the mouth parts were a little feebler than in the male, but were not specially modified.

In the male the first pleopod has three coupling setae on the inner margin of the basal portion, the outer margin being fringed with fine setae ; the exopod is long, oval, and is slightly longer than the triangular endopod ; both have the extremities and outer margins fringed with the usual long plumose setae. The second pleopod

is similar to the first, except as regards the endopod, which bears the male appendages; these appendages are narrow, longer than the endopod, and widen slightly beyond its extremity, and then narrow again to the narrowly rounded apex. The third pleopod has the exopod oval, as in the preceding pleopods, but slightly shorter than the broadly triangular endopod, both consisting of one joint only. The fourth pleopod has the endopod provided with transverse folds, the exopod with outer margin fringed with numerous short setae and the transverse folds rather poorly developed on the inner half only. The fifth pleopod is similar in general shape to the fourth, but has the exopod 2-jointed and bearing the squamous protuberances as usual. The exopod is mainly opercular, and bears only a few poorly developed transverse folds on a rounded lobe of the inner margin near the base.

Genus **Cymodocella**, Pfeffer, 1888.

Distribution.—Subantarctic seas.

Cymodocella tubicauda, Pfeffer.

Cymodocella tubicauda, Pfeffer, Jahrbuch d. wissensch. Anstalten zu Hamburg, iv, p. 110, pl. ii, fig. 8, pl. vi, figs. 11–12, 1887. *Sphaeroma egregia*, Chilton, Trans. N.Z. Inst., xxiv, p. 209, 1891. *Cymodocea antarctica*, Hodgson, "Southern Cross" Crust., p. 243, pl. xxxiii, fig. 2, 1902. *Cymodocella egregia*, Hansen, Quart. Journ. Micr. Sci., xlix, p. 126, 1905; Richardson, Expéd. antarct. française, 1903–5, Isopodes, p. 7, 1907. *C. tubicauda*, Richardson, *l.c.*, Isopodes (2e mémoire), p. 4, 1907; Hodgson, Rep. "Discovery" Isopoda, p. 31.

Recorded by Mr. Hodgson from the Auckland Islands from specimens collected by the "Southern Cross." In his report on the *Isopoda* collected by the National Antarctic Expedition Mr. Hodgson records this species from Cape Adare, and gives a full description of it. It was originally described from specimens from South Georgia, and the French Antarctic Expedition of 1903–5 took it at Booth Wandel Island, and at Wincke Island, Flanders Bay. The species has therefore a wide range in subantarctic seas, and, according to Mr. Stebbing, is probably identical with *Cymodocella* (*Sphaeroma*) *algoense*, Stebbing, 1875, from Algoa Bay, South Africa.

Genus **Dynamenella**, Hansen, 1905.

Dynamenella, Hansen, Quart. Journ. Micr. Sci., xlix, p. 107.

Distribution.—Widely distributed.

Dynamenella huttoni (G. M. Thomson).

Dynamene huttoni, G. M. Thomson, Trans. N.Z. Inst., xi, p. 234, pl. x A, fig. 6, 1879. *Cymodoce huttoni*, Chilton, Trans. N.Z. Inst., xxxviii, p. 272, 1906.

Several specimens from Antipodes Islands, collected by Dr. Cockayne in July, 1903. Very common on the New Zealand coasts.

This species appeared to me to be very closely allied to or identical with *Dynamene eatoni*, Miers, described from Kerguelen Island, and afterwards recorded by Dollfus from South America (" Mission du Cap Horn," Crustacea, p. F 66).

Dr. Calman has, however, kindly compared specimens sent to him with co-types of *D. eatoni*, and finds that, although very closely allied, *D. huttoni* is distinct in several respects : thus, *D. eatoni* is much less convex, and has the front margin of the head produced into a marked ridge hardly visible in *D. huttoni ;* the first segment of the peraeon is much broader as compared with the head ; the third segment of the peduncle of the antennule is longer and more slender, and on the terminal portion of the pleon the sinuous transverse groove found in *D. huttoni* in addition to the segmental grooves which run in from the sides is absent.

Suborder VALVIFERA.

Fam. IDOTEIDAE.

Genus **Idotea**, Fabr., 1798.

Distribution.—In all seas.

Idotea elongata, Miers.

Idotea elongata, Miers, Ann. & Mag. Nat. Hist., ser. 4, xvii, p. 225, 1876 ; Chilton, Trans. N.Z. Inst., xxii, p. 198, 1890.

Two specimens, one male and one female, from Musgrave Harbour, Auckland Islands (E. R. Waite).

The female has the brood-pouch full of eggs, and the anterior segments of the trunk expanded, but not to so great a degree as it is sometimes met with. In the mature female with eggs in the brood-pouch the peraeon is " much dilated in the middle, the second, third, and fourth segments being progressively broader and bluntly angled at the sides, fifth suddenly narrowing to less than half the width of the fourth." The lateral suture on the pleon is often very indistinct, so that the pleon is almost or quite uniarticulate.

The type specimens of this species are in the British Museum, and came from the Auckland Islands. It is common on the New Zealand coasts, and is always found on brown seaweeds, to which in colour and markings it presents a close resemblance.

Miers has also recorded it from the Falkland Islands.

Idotea lacustris, G. M. Thomson.

Idotea lacustris, Thomson, Trans. N.Z. Inst., xi, p. 250, 1879 ; Miers, Journ. Linn. Soc., xvi, p. 39, pl. i, figs. 11, 12, 1881 ; Chilton, Trans. N.Z. Inst., xxii, p. 194, 1890, and xxiv, p. 263, 1892 ; N.Z. Journ. Sci., n.s., i, p. 131, 1891.

A few specimens were gathered at Campbell Island : some, collected by Professor H. B. Kirk, were taken in the lake or lagoon at the south end of the island, into which salt water may be driven at exceptionally high tides ; others were gathered in fresh-water streams by Mr. R. M. Laing at a height of about 600 ft. above sea-level. I have also specimens collected by Professor Benham from a fresh-water creek on Mount Honey in February, 1907.

The specimen from the lagoon is quite similar in colour and other external features to specimens taken at Tomahawk Lagoon and other places in the South Island of New Zealand where the water, though usually fresh, may at times be more or less brackish. The others, gathered in Campbell Island in fresh-water streams at a considerable elevation above sea-level, are rather lighter in colour, and differ slightly in the size of the eyes and in a few other points; though these differences are in the same direction, they are not so great as those exhibited by the specimens taken in mountain-streams around Dunedin, which I have distinguished as variety β. This variety differs in the following points from the typical form, variety α, found at sea-level: (1) The eyes are much smaller, being only about half as large; (2) the front margin of the head has a slight depression in the centre; (3) the inner antennae are rather more slender and longer, reaching to the end of the third joint of the peduncle of the outer antennae; (4) the outer antenna is more slender, both in the peduncle and in the flagellum; (5) there is only one pair of sutures on the terminal segment of the pleon; (6) the extremity of the pleon is more narrowed; (7) the colour is usually lighter, being a light brown, with darker spots and markings.

I am well aware that the numerous small differences between these two varieties are quite sufficient to warrant one in making two species of them; but from the conditions under which the two forms are found it is perfectly clear that they are very closely related, one form having been derived from the other probably quite recently, and there is little doubt that the differences between them are associated with the different conditions under which they live—one in brackish water on the sea-shore, and the other in mountain-streams at a considerable elevation above the sea. If a separate species were made of the latter form its connection with the first one would be in danger of being overlooked; and, moreover, as I have already pointed out, the fresh-water forms from Campbell Island, though they are similar to those from the fresh-water streams of New Zealand, are not quite identical, and would probably require to be also distinguished by a different specific name. In New Zealand the species is common in the southern part of the South Island and the adjacent islands. It was originally taken by Mr. Thomson in Tomahawk Lagoon, near Dunedin; subsequently I took it at the mouth of a small stream running into Otago Harbour, and found the variety β in various mountain-streams around Port Chalmers and Dunedin. I have also specimens of variety α in my collection from Ruapuke Island (collected by Mr. T. Horan), and from Port Pegasus, Stewart Island (Dr. L. Cockayne), and more recently I found it in the West Coast Sounds of Otago at the mouth of nearly every fresh-water stream that I was able to examine. I have not succeeded in finding it at Lyttelton or on Banks Peninsula, though I have examined many likely places in these localities.

A form which apparently belongs to this species is found at Port Henry, Straits of Magellan, and is represented by specimens in the British Museum, which were referred to *I. lacustris* by Miers in 1881. Miers gives one or two small points in which these specimens differ from Thomson's original description, but these are not so great as the differences between varieties α and β.

Since the above remarks were written I have sent specimens of both varieties to Dr. W. T. Calman, of the British Museum, who has kindly compared them with the specimens in the Museum collections from the Straits of Magellan, and he informs

me that the brackish-water form (var. *a*) appears to be identical with the Straits of Magellan specimens, which have two sutures on the terminal segment of the pleon, Miers's figure, which shows only one, being incorrect in this particular. Dr. Calman also says that the fresh-water variety seems to be about as good a species as most species are ; but for the reasons which I have given above I think it less misleading to look upon it merely as a variety which has risen from the brackish-water form, probably comparatively recently. Unfortunately, it is not known if the Patagonian specimens are from salt, brackish, or fresh water ; but the facts now before us seem to show that *Idotea lacustris* is a species widely distributed on subantarctic shores, and is to be found chiefly in brackish water, but has in more than one place ascended fresh-water streams to a considerable height, and become slightly modified, in accordance with the different conditions to which it was exposed in these situations.

Genus **Paridotea**, Stebbing, 1900.

Paridotea, Stebbing, South African Crust., pt. i, p. 58, 1900.

Distribution.—Southern seas.

I have followed Stebbing in adopting the genus *Paridotea*, though one of the main characters on which he founded it (the amount of segmentation indicated in the pleon) is subject to variation even within the limits of a single species, as I have elsewhere shown,* and the custom of establishing a new genus for a single species, unless done after full review of allied species, is apt to lead to needless complication, by making necessary the creation of other genera on equally small and unimportant points of structure.

Paridotea ungulata (Pallas).

Oniscus ungulatus, Pallas, Spicil. Zool. Fasc., ix, p. 62, pl. iv, fig. 11, 1772. *Idotea ungulata*, Miers, Journ. Linn. Soc., Zool., xvi, p. 52, 1881 ; Chilton, Trans. N.Z. Inst., xxii, p. 196, 1890. *Paridotea ungulata*, Stebbing, South African Crust., pt. i, p. 53, 1900, and pt. ii, p. 56, 1902 ; Chilton, Trans. N.Z. Inst., xxxviii, p. 272, 1905.

One specimen was taken in Carnley Harbour by Professor Benham ; it was taken on *Ulva*, and was, like the *Ulva*, of a bright-green colour.

The species is widely distributed in the southern seas, being known from New Zealand, South Australia, Chili, Rio Janeiro, South Africa, and the Indian Ocean.

In the paper last quoted I have given some account of the sexual differences in this species.

Suborder ONISCOIDEA.

Fam. TRICHONISCIDAE.

Genus **Trichoniscus**, Brandt, 1833.

Distribution.—World-wide. The section of the genus to which the following species belong is confined to lands in the Southern Hemisphere.

* Trans. N.Z. Inst., xxii, pp. 197, 199, and 201.

Trichoniscus thomsoni (Chilton).

Philygria thomsoni, Chilton, Trans. N.Z. Inst., xviii, p. 159, pl. v, figs. 1–6, 1886. *Trichoniscus thomsoni*, Chilton, Trans. Linn. Soc., viii, p. 118, pl. xiii, fig. 1, 1901 ; Budde-Lund, Deutsche Süd-polar Exped., 1901–3, ix, p. 83, pl. iv, figs. 22–24, 1904.

A few specimens obtained at Auckland Islands appear to belong to this species. They differ slightly from specimens from the main islands of New Zealand in having the surface of the body somewhat rugose, and in having the fifth joint of the peduncle of the antennae roughened with setose tubercles on its inner side. They are, however, too closely related to be distinguished as a separate species.

Dr. Budde-Lund has pointed out that the species of *Trichoniscus* from New Zealand, Tierra del Fuego, and other places in southern lands belong to a section of the genus which is distinguished by having the three ocelli of the compound eye separated from one another, and to this section he has added a new species, *T. verrucosus*, from the Crozet Islands. Dr. Budde-Lund has also pointed out the near relationship between *T. thomsoni* and *T. magellanicus*, and the existence of the latter species on Auckland and Campbell Islands has enabled me to confirm what he says. *T. thomsoni* differs, however, in having the segments of the peraeon broader, the lateral parts especially being greatly dilated, and, as a result, the body is less convex than in *T. magellanicus ;* the uropoda, though closely similar, are hardly so long and slender as in *T. magellanicus*.

Trichoniscus magellanicus (Dana).

Styloniscus magellanicus, Dana, U.S. Expl. Exped., xiii, Crust., p. 736, pl. xlviii, figs. 7 *a–g*, 1853 ; Dollfus, "Mission du Cap Horn," Crust., p. F92, fig. 14 *a–c*. *Trichoniscus magellanicus*, Stebbing, P.Z.S., 1900, p. 566 ; Budde-Lund, Deutsche Süd-polar Exped., 1901–3, ix, Zool., i, p. 83, pl. iv, fig. 25, 1904.

Several specimens from Auckland Island, and some also from Campbell Island, must, I think, be referred to this species, which is also known from Tierra del Fuego and from the Falkland Islands.

My specimens agree very closely with the description of the species given by Stebbing, the only point of difference that I can find being that the flagellum of the outer antenna contains only six joints, indistinctly marked, while his specimens were 7–8-jointed. The species also seems very close to *T. verrucosus*, Budde-Lund, from the Crozets, which has four to six joints of the flagellum of the antenna ; that species, however, appears to have the surface more rugose than in my specimens. Probably *T. verrucosus* will prove to be either identical with *T. magellanicus* or only a local variety of this widely distributed subantarctic species.

Genus **Haplophthalmus**, Schöbl, 1860.

Distribution.—As yet recorded only from Europe and America and New Zealand, but I have also an undescribed species from Tasmania. The New Zealand species differ from the generic characters in one or two points (see below).

Haplophthalmus australis, sp. nov.

Body oblong-oval, about half as broad as long, the epimeral plates of the peraeon being large and projecting horizontally, those of the first four segments somewhat widely separated. The head with the front triangularly rounded and tipped with small denticles, two rounded tubercles being situated about the centre of the head and an indistinct longitudinal ridge on each side ; lateral lobes small and subacute. Dorsal surface of the peraeon moderately convex, each segment with the surface somewhat roughened, and bearing a number of rounded tubercles ; these form a fairly well marked median ridge and a less well marked lateral ridge on each side, with indications of another poorly marked ridge one each side external to this. Surface of the pleon (fig. 17*g*) without tubercles, first three segments short, the first two without epimeral projections, the third with very small narrow epimera, fourth and fifth with epimera large and well developed, terminal segment broad, triangular, posterior border, straight.

Antennae with the fourth joint of the peduncle as long as the two preceding and rather shorter than the fifth ; flagellum almost as long as the fifth, consisting of four or five joints, the last tipped with a pencil of long setae ; the whole antenna covered with fine short setae. Uropoda with the branches equal in length, but the inner slightly more slender than the outer ; both covered with fine setae, and tipped with a pencil of long hairs.

Length, 6 mm. ; greatest width, 2·5 mm.

Colour.—Lightish-brown.

Hab.—Campbell Island, on decaying wood and at roots of plants.

Type in Canterbury Museum, New Zealand.

The animal runs with great rapidity, and, although several were seen, I was able to secure only a very few specimens ; further specimens were, however, afterwards obtained by Messrs. Chambers and Des Barres.

Another species, *Haplophthalmus helmsii*, Chilton, has been described from Greymouth, in New Zealand. It differs from the generic characters given by Sars in having the first three segments of the pleon short and without epimeral expansions. In the present species the first three segments are also short, the first two quite without epimeral expansions, but the third has very small narrow expansions ; in this species, too, the eyes consist of three ocelli, instead of only one, as given in Sars's description ; there are also some slight differences in the maxillipedes, which approach still more closely than in other species to those of *Trichoniscus*.

It would be easy, and perhaps justifiable, to place the New Zealand species under a new genus, and I had at one time thought of doing this, in the belief that all the southern species would differ from the northern species in the points mentioned. I have, however, an undescribed species from Tasmania which agrees with the northern species of *Haplophthalmus* in having only the first two segments without the epimeral expansions, while, as I have pointed out above, *H. australis* is to some extent intermediate as regards the characters of the pleon, and, as there are only a few species hitherto described in this genus, I prefer to slightly widen the generic characters rather than to create a new genus.

Sars has pointed out that *Haplophthalmus* comes very near to *Trichoniscus*, and the species now described approaches still nearer, in having the eyes formed of three ocelli and in the character of the terminal portions of the maxillipedes.

I append a more detailed description of the appendages.

The *antennules* (fig. 17*a*) have the first joint large, slightly curved; the second joint not quite half the length of the first; third joint nearly twice as long as second, but very slender, tipped with about five or six sensory setae, but otherwise without setae; the first and second joints bear a few fine setae.

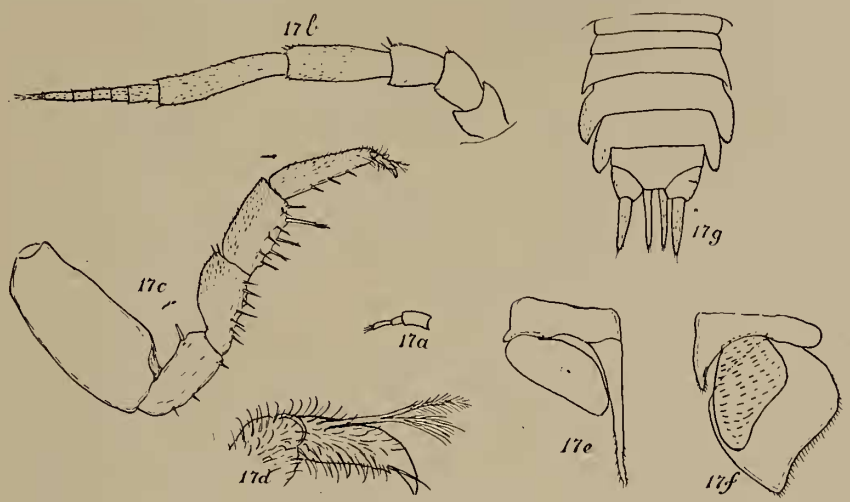

FIG. 17.—*Haplophthalmus australis*, sp. nov.

17*a*. Antennule.
17*b*. Antenna.
17*c*. Seventh leg of male.
17*d*. Extremity of same (more highly magnified).
17*e*. Second pleopod of male.
17*f*. Third pleopod of male.
17*g*. Pleon and uropoda (from above).

The *antennae* (fig. 17*b*) have the first three joints increasing in length, the fourth as long as the two preceding and rather shorter than the fifth, which is slightly narrowed and a little curved at its proximal end; the flagellum is almost as long as the fifth joint, and consists of four or five joints, the last one being tipped with a pencil of long setae; all the joints of the antennae are thickly covered with fine short setae, and one or two stouter setae are found at the end of the third and fourth joints of the peduncle.

The *upper lip* has the anterior border regularly rounded and fringed with short setae.

The *mandibles* have the incisor process composed of three or four stout teeth, and the molar process prominent, covered with short stout setae, with a long plumose setae lying alongside it; in the left mandible the lacinia mobilis is circular at its extremity and bears a ring of short teeth or setae, at its base arises a single stout plumose hair; the right mandible has the lacinia mobilis ending in three stout teeth like those of the incisor process, and two stout plumose hairs arise at its base.

The *lower lip* is deeply cleft into two lobes, each fringed with setae along their outer border, and also round the margins of the cleft.

The *first maxilla* has the outer lobe narrow, ending in about a dozen stout curved setae, the outer ones being the stronger, and brownish in colour; the outer margin of the lobe bears numerous setae arranged in small tufts, and a few rather longer setae are found on the inner margin. The inner lobe bears the usual three setae at

its extremity, the two terminal ones being subequal, the proximal nearly twice as long.

The *second maxilla* is of about the same width throughout; it is indistinctly cleft at the end, the outer lobe being much narrower than the inner; the whole of the extremity is covered with a thick fur of short setae; other setae are found along the inner border and on the distal portion of the outer border.

The *maxillipedes* have the first joint short and the epipod short and rounded at the end; the second joint is large, expanded, inner margin straight, outer margin strongly curved, both fringed with long setae; the terminal part of the maxillipedes forms a single piece, with only faint indications of division into separate joints; the epignath is shorter than the terminal lobe and narrower, and appears to have a separate small joint at the end, the whole of it being thickly covered with setae.

The *legs* (fig. 17*c* and 17*d*) are all approximately the same size and shape, the seventh leg only slightly longer than the first; they bear long stout setae of the usual character, especially on the inner margin of the merus and the carpus, and all the joints are covered with fine short setae, which are particularly noticeable on the propod and on the dactyl; the dactylar seta has the same structure as in *Trichoniscus*—viz., it consists of a basal portion which divides into two branches, the inner one of which at once splits up into further fine divisions, while the outer is continued as a long plumose seta; the dactyl also bears on the inner side a secondary nail and a stout curved seta arising near it and extending a little beyond the extremity of the dactyl.

The *pleopoda* appear to be similar to those of *Trichoniscus*. According to Sars, the first pair of pleopoda in the female of this genus are very small and rudimentary, while those in the male are well developed, with the inner ramus strongly produced, biarticulate, terminal joint spiniform; I accidentally failed, however, to find the first pleopod in the single male specimen that I dissected. The second pleopod of the male (fig. 17*e*) has the inner branch long and narrow, the end fringed with setae, and apparently undivided and not marked off from the short but wide basal joint. The third pleopods (fig. 17*f*) have the inner angle of the basal joint somewhat produced and fringed with setae; the inner branch is much smaller than the outer, which is operculiform, and articulated to the outer portion of the basal joint, and has the outer margin fringed with fine setae. The fourth and fifth pleopods are similar to the third, though the shape of the outer branch and the proportional sizes of the two branches are not quite the same.

The *uropods* have already been sufficiently described.

Fam. Scyphacidae.

Genus **Scyphoniscus**, Chilton, 1901.

Distribution.—At present known only from New Zealand and adjacent islands.

In order to include the following species the generic characters, which were based on those of the single New Zealand species then known, will require slight alteration. The first character—"body rather narrow, lateral parts not greatly developed"—will have to be omitted, as the present species is fairly broad, especially in the female. The antennae should be defined as having the flagellum consisting of a few ill-developed joints, instead of "three ill-developed joints," as the actual number of joints seems to vary to some extent

Scyphoniscus magnus, sp. nov.

Specific Diagnosis.—Body in the female broadly oval, about half as broad as long; in the male much narrower, hardly more than a third as broad as long. Surface of cephalon and peraeon somewhat rugose, being covered with small roughened tubercles. Cephalon (fig. 18*a*) with the lateral lobes large, broadly rounded, front produced in the middle line into a shallow rounded lobe; eyes well developed, lateral, containing about nine or ten ocelli. Margins of first segment of peraeon produced into rounded lobes reaching nearly to the eyes, posterior margin of first four segments straight and with the posterior angles rectangular, those of the next three

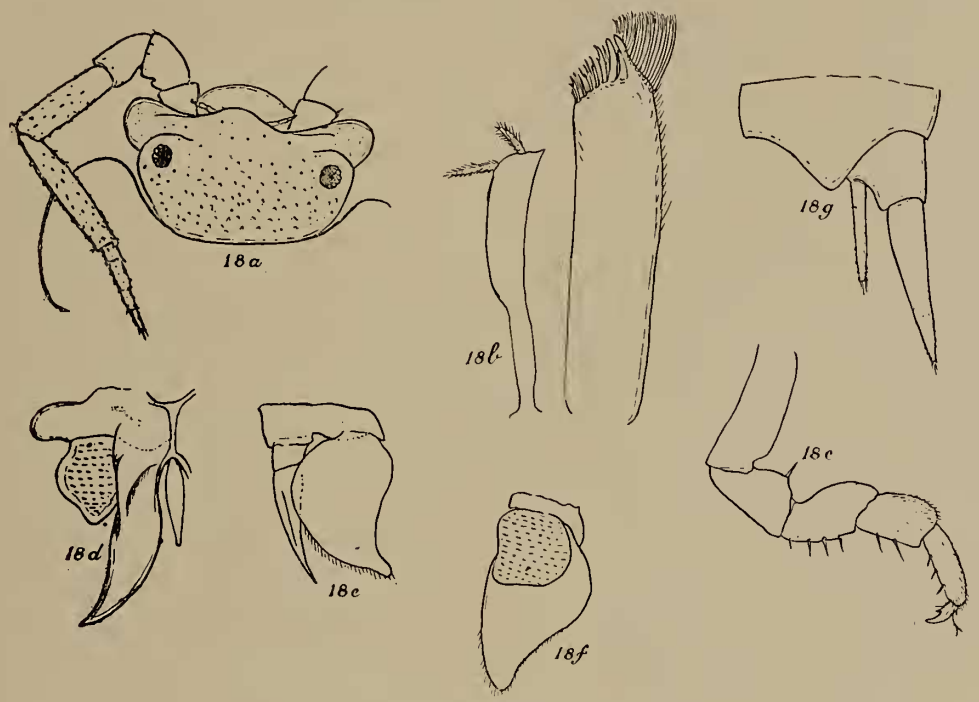

Fig. 18.—*Scyphoniscus magnus*, sp. nov.

18*a*. Head and antenna.
18*b*. First maxilla (highly magnified).
18*c*. Seventh leg of male.
18*d*. First pleopod of male.
18*e*. Second pleopod of male.
18*f*. Third pleopod of male.
18*g*. Telson and uropoda.

segments with posterior angles more and more acutely produced. Pleon with the first two segments short, the third to the fifth with moderate lateral expansions, last segment short, about twice as broad as long, subacutely produced posteriorly. Antennae with the last joint of peduncle nearly as long as the two preceding; flagellum as long as the penultimate, and consisting of four fairly well marked subequal joints, the last ending in a small tuft of fine setae; the peduncle with margins of all the joints fairly smooth and bearing only a number of short fine setae. Legs (fig. 18*c*) short, the last pair only slightly longer than the first, and not specially modified in the male. The uropoda (fig. 18*g*) rather shorter than pleon; peduncle stout, produced inwards into a small lobe bearing the inner ramus; inner ramus

rather more than half as long as the outer, which is more than twice as long as the peduncle, both ending in a few fine setae.

Colour.—Pale-yellowish, with the dorsal surface more or less darkly pigmented.

Length, 10 mm. ; greatest breadth (of female), 5 mm.

Hab.—Campbell Island, abundant on the shore of Perseverance Harbour about high-water mark ; Ewing Island (Dr. L. Cockayne).

Type in Canterbury Museum, New Zealand.

This species differs from *S. waitatensis*, which is found on the coasts of the South Island of New Zealand, in being much larger and broader (in the female) and in having the surface of the body less tuberculated ; there are also slight differences in the antennae and some of the mouth parts.

The mouth parts are, on the whole, similar to those of *S. waitatensis*, but in the first maxilla (fig. 18*b*) the outer portion approaches somewhat more nearly to the normal type—viz., it bears at the end a number of stout slightly curved setae, succeeded by more slender setae on the inner side ; the outermost one, however, is thickly fringed on its outer margin with long fine setae curving slightly inwards, giving the same general appearance as in *S. waitatensis*, in which, however, the stout setae appear to be absent and the joint ends in a rounded lobe fringed with the long setae. The maxilliped has the palp with the various joints of which it is composed rather better indicated than in *S. waitatensis*. The other mouth parts call for no special attention.

The male differs from the female in having the body much narrower, but there seem to be no secondary sexual characters in the legs or other appendages. The first pleopod of the male (fig. 18*d*) is specially modified, the exopod is small and of the usual shape, but the endopod is developed into a strongly chitinized organ which appears to be unjointed and to be fused with the basal portion of the pleopod ; it is more than twice as long as the exopod, and curves outwards towards the end, which narrows somewhat abruptly to the acute termination ; the single male organ appears more or less fused with the first pleopod, and is seen in the median line as a small narrow appendage less than half as long as the endopod. In the second pleopod (fig. 18*e*) the endopod is two-jointed, the first joint short, broader than long ; the second joint reaching as far as the end of the exopod, narrowly triangular in shape, and ending acutely ; the exopod is articulated to the protopod towards its outer border, and forms a flat opercular lamella, with the inner margin strongly curved, the outer margin concave towards the end (which is fringed on both sides with fine setae) and convex near the base. In the third pleopod (fig. 18*f*) the endopod is branchial in structure, nearly rectangular, with the angles rounded, and is not quite half as long as the opercular exopod, which has the same general shape as in the second pleopod, but is broader towards the distal end. The fourth and fifth pleopods are similar to the third.

Genus **Deto**, Guérin, 1834.

Distribution.—Widely distributed in subantarctic regions.

Deto aucklandiae (G. M. Thomson).

Actaecia aucklandiae, G. M. Thomson, Trans. N.Z. Inst., xi, p. 249, 1879.
Scyphax (?) *aucklandiae*, Chilton, Trans. Linn. Soc., viii, p. 126, pl. xv,

fig. 2, 1901. *Deto magnifica*, Budde-Lund, Deutsche Süd-polar Exped., ix, p. 86, 1906. *D. robusta*, Budde-Lund, *l.c.*, p. 87, pl. iv, figs. 42–44, 1906. *D. aucklandiae*, Budde-Lund, *l.c.*, p. 87 ; Chilton, Trans. N.Z. Inst., xxxviii, p. 273, 1906.

Several specimens of this species were obtained on previous occasions at Ewing Island, in the Auckland Group, but unfortunately no additional specimens were collected during the expedition. It is a very large and handsome species, reaching a length of 23 mm., and it shows very marked sexual dimorphism, the male (fig. 19*a*) differing from the female (fig. 19*b*) in the greater development of tubercles on the dorsal surface and particularly in the size and thickness of the external antennae. These are very massive, and have the various joints fully twice as broad as those of the female ; they have been figured by Budde-Lund under the name *D. robusta*. The joints of the flagellum, and to some extent also the terminal joints of the peduncle, are thickly covered with a fine down of short setae. In the male, too, the tubercles on the dorsal surface are much better marked than in the female ; each segment bears a row of about ten to twelve tubercles, the lateral ones being longer than those in the centre, and projecting up from the dorsal surface like short blunt spines* ; in the pleon they are much shorter, and form slight tubercles only, similar to those found on the dorsal surface of the peraeon in the female.

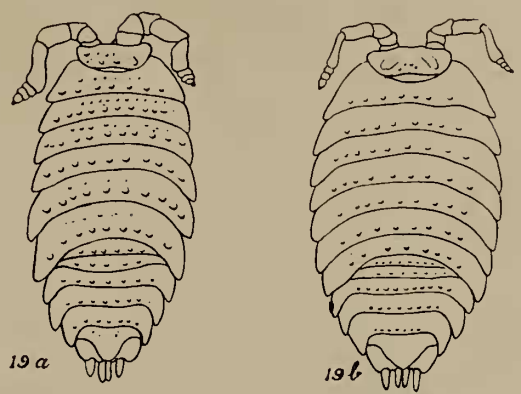

Fig. 19.—*Deto aucklandiae* (G. M. Thomson).

19*a*. Male (dorsal view) ; × 2.
19*b*. Female (dorsal view) ; × 2.

When preparing my paper on the terrestrial *Isopoda* of New Zealand, quoted above, I had only a single female specimen of this species, and the male then remained unknown. There are three dried specimens of this species, from Auckland Island (one of them imperfect), in the Dresden Museum ; these were examined by Budde-Lund, who has described them as forming two new species, *D. magnifica* and *D. robusta*, though he stated that the first one was perhaps not distinct from *D. aucklandiae*. I have no doubt that both of his species must be referred to *D. aucklandiae*, his description of *D. robusta* being evidently based mainly on the examination of a male specimen, and agreeing closely with the male specimens in my collection.

I had formerly considered *Oniscus novae-zealandiae*, Filhol, as a doubtful synonym of *D. aucklandiae*, but specimens since received from the Chatham Islands and from Stewart Island show that it is a distinct species, and must therefore be known as *Deto novae-zealandiae*. It differs from *D. aucklandiae* in the secondary sexual characters, for the male has the lateral portions of the first segment of the peraeon dilated into two bladder-like structures. A female specimen belonging

* These are much longer than is shown in fig. 19*a*.

to this species was obtained on Stewart Island during the expedition, and from a comparison of the figures given in Gay's "Historia di Chile" it is evident that *Oniscus bucculentus*, Nicolet, and *Oniscus tuberculatus*, Nicolet, from Chili, are male and female either of this same species or of one very closely allied.

Other species of the genus are found at the Cape of Good Hope; at St. Paul, in the New Amsterdam Group; and in Australia.

Fam. Oniscidae.

Genus **Oniscus**, Linnaeus, 1767.

Distribution.—The genus *Oniscus* is cosmopolitan, but the section to which the following species belongs is, so far as at present known, confined to Australia and New Zealand.

Oniscus punctatus, G. M. Thomson.

Oniscus punctatus, G. M. Thomson, Trans. N.Z. Inst., xi, p. 232, pl. x*a*, fig. 3, 1879; Chilton, Trans. Linn. Soc., viii, p. 133, pl. xvi, fig. 2, 1901; Trans. N.Z. Inst., xxxviii, p. 273, 1906.

Numerous specimens were obtained at Auckland Island, and are quite the same as those found in New Zealand, where the species is very widely spread. The same species, or one very closely allied, is also found in Tasmania and Australia.

This species does not come strictly under the genus *Oniscus* as now restricted. Dr. Budde-Lund, by letter, some years ago told me that he was establishing a new genus, *Phalloniscus*, for its reception, but I am not aware whether this genus has yet been published.

Genus **Cubaris**, Brandt, 1833.

Distribution.—Cosmopolitan.

Cubaris rugulosus, Miers.

Cubaris rugulosus, Miers, Ann. & Mag. Nat. Hist., ser. 4, xvii, p. 225, 1876; Cat. N.Z. Crust., p. 96, pl. ii, fig. 5, 1876. *Armadillo rugulosus*, Chilton, Trans. Linn. Soc., viii, p. 147, pl. xvi, fig. 7, 1901. *Spherillo rugulosus*, Budde-Lund, Revision of Crust. Isopoda Terrestria, iii, p. 65, pl. vii, figs. 37–39, 1904.

This species appears to be common in the Auckland Islands. Professor Benham gathered it near Port Ross, in the north of Auckland Island; under logs at Carnley Harbour, in the south; and one specimen on Disappointment Island. It also occurs in Campbell Island, where it was collected by myself and by Messrs. Chambers and Des Barres.

These specimens appear to be quite the same as those from the main islands of New Zealand, where the species is widely distributed, and is particularly abundant in the more southern parts. Dr. Budde-Lund has revived Dana's name *Spherillo* for a section of the genus hitherto known as *Armadillo*, but as I do not quite understand the characters given by him in the definition of *Spherillo*, and as the name *Cubaris* is older and has been adopted by Stebbing and Calman, I also have used it.

The species grouped by Dr. Budde-Lund under *Spherillo* belong mainly to Australia and the various islands in the Pacific, south-east Asia, and the Malayan Archipelago ; while those which he retains under *Armadillo* are nearly all inhabitants of Europe, Asia Minor, Africa, and America.

Order TANAIDACEA.

Fam. Tanaidae.

Genus **Tanais**, Audouin and Milne-Edwards, 1829.

Distribution.—Cosmopolitan.

Tanais novae-zealandiae, G. M. Thomson.

Tanais novae-zealandiae, G. M. Thomson, Ann. & Mag. Nat. Hist., ser. 5, iv, p. 417, pl. xix, figs. 5, 6, 1879 ; and Trans. N.Z. Inst., xiii, p. 207, fig. 3, 1881.

One specimen, from Perseverance Harbour, Campbell Island, taken on the shore with *Exosphaeroma gigas*, &c. It is darkly pigmented. Another was taken at the Snares.

The species is common on the coasts of New Zealand, and at present is not known elsewhere, though it may prove to be more widely distributed.

Order CUMACEA.

I am not aware that any *Cumacea* have been described from these islands. In his report on the *Cumacea* collected by the National Antarctic Expedition, 1901–4, Dr. W. T. Calman mentions that a species of Cumacean was obtained from the Auckland Islands ; it was not included in his report, as it is not antarctic, but I do not know whether it has yet been described elsewhere.

Order NEBALIACEA.

Fam. Nebaliidae.

Genus **Nebalia**.

Distribution.—Probably cosmopolitan, but best represented in northern and in southern seas.

Nebalia longicornis, G. M. Thomson.

Nebalia longicornis, G. M. Thomson, Ann. & Mag., Nat. Hist., ser. 5, iv, p. 418, pl. xix, figs. 7–9 ; Sayce, " Victorian Naturalist," xviii, p. 151, 1902 ; Thiele, Rep. " Valdivia " Crust., viii, p. 9, pl. iv, figs. 66–69, and Nat. Antarct. Exped., 1901–4, iii, Leptostraca, p. 1.

One small specimen, from Musgrave Harbour, collected by Professor Benham.

This species was originally described from a male specimen taken in Dunedin Harbour, New Zealand, and appears widely distributed in the southern seas ; Sayce

has recorded it from Port Phillip, Victoria, and, according to Thiele, the specimens collected by Dr. Willey in the Friendly Islands and at New Britain also belong to this species. In his report on the *Leptostraca* collected by the "Discovery," Thiele states that *N. longicornis*, var. *magellanica*, has been found at McMurdo Strait, and that it was also taken by the German Antarctic Expedition at the winter quarters at Gaussberg. The species is very close to *N. bipes*, the northern form, and Dr. Willey's specimens were referred to *N. bipes* by Mr. Stebbing. Ohlin also placed in this species specimens gathered in Magellan Straits; these, however, Thiele considers to be a variety of *N. longicornis*, distinguishing it under the name *magellanica*. In the Berlin Museum there are specimens from Cuba which Thiele also refers to this species, considering them, however, to represent another variety, which he has named *soror*.

Subclass CIRRIPEDIA.

No special attention was devoted during the expedition to the *Cirripedia* and the other groups of the *Entomostraea*. A few species were previously known from the islands, and one more is now added.

Order THORACICA.

Fam. Balanidae.

Genus **Balanus**, Lister.

Distribution.—In all the warmer parts of the globe.

Balanus porcatus, Da Costa.

Balanus porcatus, Da Costa, Hist. Nat. Test. Brit., p. 249 (1778); Darwin, "Monograph Cirripedia," Balanidae, p. 256, pl. vi, figs. 4*a*–4*e*, 1854. Hutton, Trans. N.Z. Inst., xi, p. 328, 1879; Filhol, "Mission de l'Île Campbell," p. 487, 1885.

Recorded from Campbell Island by Hutton and by Filhol. The species also occurs in New Zealand, and is widely distributed in Europe, America, &c.

Balanus campbelli, Filhol.

Balanus campbelli, Filhol, "Mission de l'Île Campbell," p. 487, 1885.

Described by Filhol from specimens gathered at Campbell Island.

Balanus decorus, Darwin.

Balanus decorus, Darwin, "Monograph Cirripedia," Balanidae, p. 212, pl. ii, figs. 6*a*, 6*b*, 1884; Hutton, Trans. N.Z. Inst., xi, p. 328, 1879.

Specimens were collected at Auckland Island during the expedition. The species is common in New Zealand, and is found also in Australia.

Subclass COPEPODA.

Order EUCOPEPODA.

Fam. Calanidae.

Genus **Deguernea**, G. M. Thomson, 1902 (= *Guernea* G. M. Thomson, 1895).

Deguernea antarctica (G. M. Thomson).

Guernea antarctica, G. M. Thomson, Trans. N.Z. Inst., xxvii, p. 213, pl. xiv, 1895. *Deguernea antarctica*, Hutton, Index Faunae N.Z., p. 270, 1904. *Guernella antarctica*, Mrazek, Hamburgher Magalhaensischen Sammelreise, Süswasser-Copepoden, p. 25.

Hab.—Macquarie Island, in a fresh-water pool (A. Hamilton).

Fam. Peltidiidae.

Zaus contractus, G. M. Thomson.

Zaus contractus, G. M. Thomson, Trans. N.Z. Inst., xv, p. 106, and xxvii, p. 213.

Hab.—Macquarie Island (A. Hamilton).

This species occurs also at New Zealand. The Macquarie Island specimens differ in some respects from the type, and Mr. Thomson has suggested the name *Z. hamiltoni*, should they prove to form a distinct species.

Subclass BRANCHIOPODA.

Order CLADOCERA.

Fam. Daphniidae.

Genus **Chydorus**.

Distribution.—Cosmopolitan.

Chydorus minutus, G. M. Thomson.

Chydorus minutus, G. M. Thomson, Trans. N.Z. Inst., xi, p. 262, pl. ii, fig. E3, 1878, and xxvii, p. 211, 1894.

Specimens from a fresh-water pool in Macquarie Island (A. Hamilton) are considered by Mr. Thomson to belong to this New Zealand species.